MODEL AIRPLANE NEWS

SEPTEMBER 1950 • 25 CENTS

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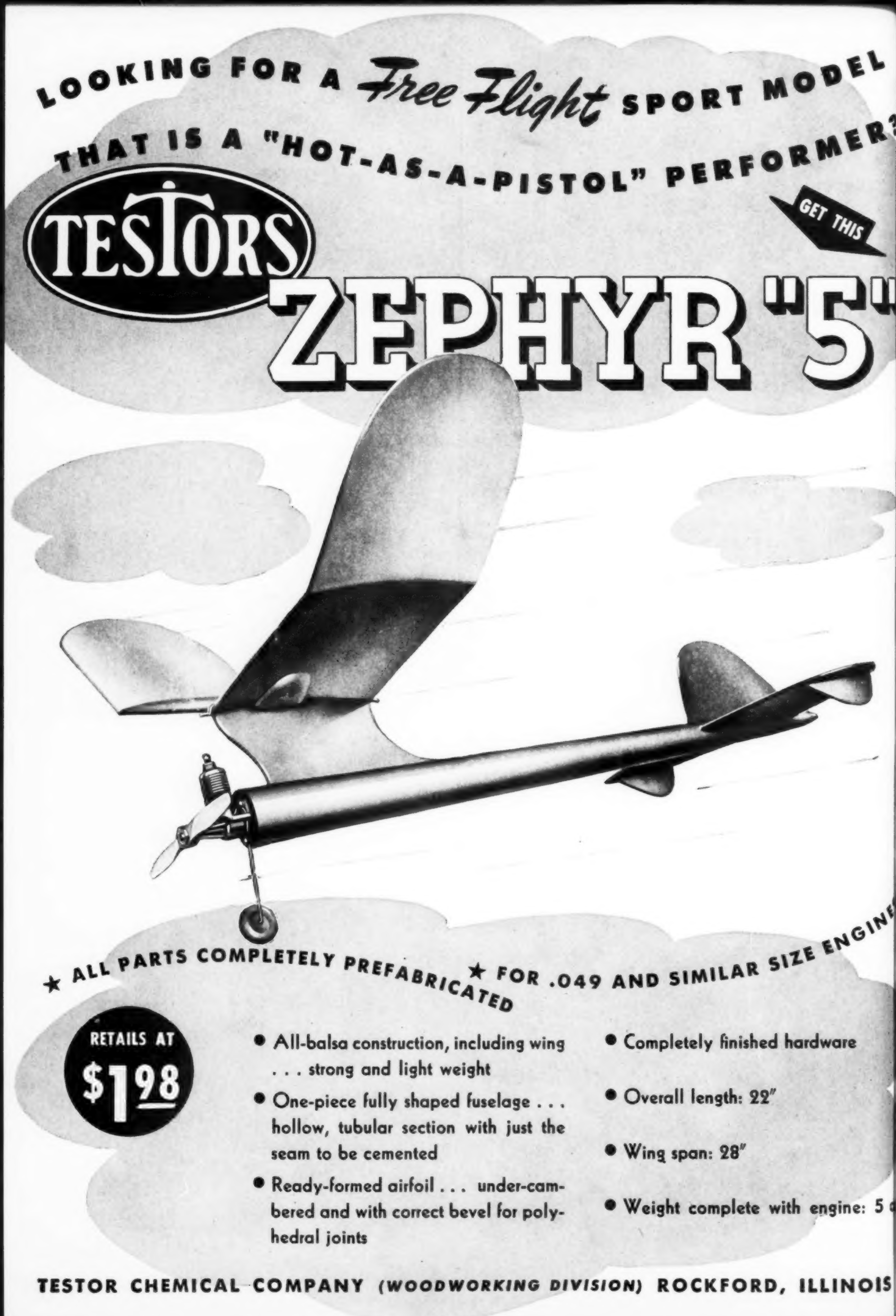
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WITTICH D. HOLLOWAY .... Art Director

Contributing Editors: Charles H. Grant, Robert C. Hare, Robert McLarren, Leonard Wieczorek, Jim Saftig

Advertising Department. MAIN OFFICE: 551 Fifth Ave., New York 17, N. Y. West Coast: (Calif., Ore. and Wash.) Justin Hannon, 4623 Crenshaw Blvd., Los Angeles 43, Calif.

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By BILL WINTER

ANY FOG around here this a.m. is inside, not outside. The Mirror Model Flying Fair, that aeronautical Coney Island, happened (that's the word) two days ago. We are still in a condition of shock. As number 977 in the first 1,000, the "lucky" ones who were accepted, we didn't even get to fly. Don't take this wrong; the meet was wonderful. After four years, that New York newspaper has profited from past experience to run off a smooth meet, handling the 250,000 spectators (wish we could say we had counted them for you!) with an efficiency all contest directors could study to advantage. It was the wind, that *infernal*, CUSSED wind! Bethpage, Long Island, (the Grumman field) presumably out of the wind belt, like those midwestern Nationals sites, was scoured all day by breezes of 25-30 mph with gusts to who knew what. Stunters went clunk on the cruel concrete, and speed jobs—bouncing up and down—kept nicking prop blades. The scream of runaway engines told what a rough time it was. But there's *always* plenty of fellows to take home the prizes.

Most of our day was spent looking busy at the R.C. event. For a while it seemed as though the fellow with the tallest antenna would be awarded the prize. Never have we seen such gorgeous antennas, or so many jammed in together. They were scrambled together like umbrellas on Fifth Avenue of a rainy afternoon. One was so high that a spectator said it should have a red light as a warning to aircraft. For the most part the individual disasters here were easier to watch than at stunt or speed because the crashes occurred beyond hearing and seeing—some two miles away. Everyone had perfect control of the rudder but not of the airplane, or so it seemed. *Rudder Bugs*, and first cousins thereof, were everywhere. At least their owners could fly them in that wind. Most were okay as long as they stayed upwind and did nothing. Since you can't win by doing nothing, they would start their maneuvers, and then they'd drift.

There was one ship and one flight (we haven't been able to get it out of mind after two days) which, to our way of thinking, put the hand writing on the wall for old style airplanes. That was when Fran McElwee sent up a five-foot job with a *McCoy*, and a U-control type prop. It was a trike job, the engine running on glow. It had a Walker pressure tank with regulator, and rudder-only control.

Well, sir, this job bored right into that wind and must have done its one-quarter mile cross country in a bee line before the pilot judged it safe to fiddle around. The ship hardly seemed to rock, whereas even the *'Bugs* bounced spectacularly, so its wing loading must have been fairly high. Well upwind and with plenty of altitude, it made its 180's, one spin, then was overhead. McElwee then flew it back upwind again and went on. Finally, at about a 1,000', maybe 1,500' downwind, he began a gliding approach. That job never was allowed to turn out of the wind and would have hit the spot if a last-second gust hadn't swept it off toward the cars before rudder could take hold.

Actually, McElwee hadn't done much from a spectator's point of view—from the R.C. man's point of view, it was a dramatic, smooth job. The real test of one of these things is maneuverability in the wind. That boils down to not losing ground to the wind. What usually happens is that, downwind, you make a turn and as you come back into the wind, you try to stop it. If a split second late, the ship can go around again, losing a couple of hundred feet more to drift; too soon and, if you are limited by one of those rudder sequence problems, you have to use the wrong rudder position before you can get to the right one. On a sharp turning job in gusty weather this may cause a sweeping turn downwind in the wrong direction. McElwee had no such trouble.

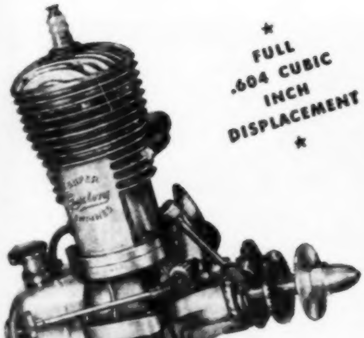
First, he had the power and speed needed to cut through the wind. Second, he had a self-neutralizing escapement, homemade we believe, which permitted him to use rudder two and three times on one turn. This meant that the ship could have strong rudder action for positive maneuvering when rudder was held on. Otherwise he just blipped that rudder—a touch here and a touch there—to make a monkey out of the wind. We'd say his technique puts him up there with Walt Good and company. Nevertheless, it was obvious that you either use a self-neutralizing escapement or have some means of working the four-toothed wheel type to get instant rudder positions. Since Walt Good himself uses such a gimmick, the point makes itself. This if the wind blows a gale. In calm weather it makes little difference, except that you have to think more with one type escapement than with the other.

Now, if we had put our .09 *Citizen* into the air it would have vanished tail first over the horizon. Guess you must make up your mind, as in any event, whether you want to sport-fly or contest-fly. Under tough conditions the same airplane is not capable of both. Anyhooo, we, too, would lose those turns to the wind. McElwee gave us a few tips which we'll pass along. We have been using the short-nosed designs. Fran says that in developing this new job of his, via several stepping stones from the old *Radart*, he kept using longer and longer noses. This helped the turn. That's common sense, now that the answer is provided, for doesn't a long nose raise heck in free flight, where you want the opposite type of turn, namely, a sharp one? Our own developments are coming down the same track but we had missed that nose business and the significance of the self-neutralizing escapement which gave Fran almost as much control as separate right and left rudder controls. Wisely, he uses a good solid escapement; this is one item that has suffered through weight-saving. On a five- or six-foot ship it is better to have a good unit, at twice the weight, even using intermediate batteries, than contend with escapement worries.

The Mirror Meet showed us again that model building is *so* relaxing. At one o'clock the night before the meet we hunted through thirty-odd miles of filling stations in the rain to get gas for the 120-mile trip. Up again at 2:45 a.m. A mad ride! At daylight the swaying trees stood revealed. Sunburn, flat feet, soda pop, and frustration! The ride home again. New York Sunday traffic with all Jersey people going to Long Island, Connecticut, etc., and inhabitants of those domains all going to Jersey. Why don't they get together? (Like the people who walk through railroad trains, where do they all go?) Still we do it.

Stopped in a run-down hardware store

(*Turn to page* 34)



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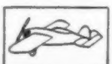

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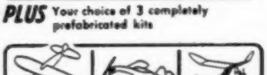

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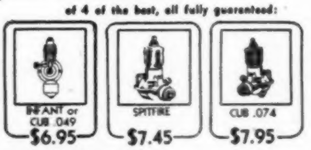

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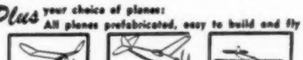

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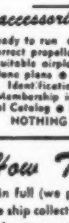

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AND another U. S. turbo-prop airplane has taken to the air, the Douglas XA2D-1 *Skyshark* Navy attack plane. It follows close on the heels of the Convair XP5Y-1, powered by four turbo-prop engines, in making its initial test flight. However, the *Skyshark* is not the second U. S. turbo-prop-powered airplane to fly, nor even the third! First was the Convair XP-81 fighter back in 1945. Second was the Ryan XF2R-1 *Dark Shark* in 1947. Both of these fighters were powered by General Electric T31-GE-1 turbo-prop engines. And if you want to include all U. S. airplanes that have flown on turbo-prop power, you must add the Boeing B-17 flying test beds that have been flown solely by a Wright XT-35 and a Pratt & Whitney XT-34 turbo-prop engine, respectively. So that the U. S. is hardly a newcomer to the turbo-prop field, despite what our English cousins may claim. The *Skyshark* started out as simply a Douglas AD *Skyraider* with a turbo-prop engine installed, in place of the Wright R-3350 reciprocating engine in the nose. But as the design progressed, more and more changes were required until the new XA2D-1 resembles its older brother only in vague outline. Power is supplied by the big Allison XT-40-A-2 turbo-prop engine developing 5,500 hp, more than twice the power of the *Skyraider!* The engine differs from the standard T-40 in the addition of a counter-rotating extension shaft to carry the power from the engine located behind the pilot to the counter-rotating propellers in the nose. To gain the most from this added power, Douglas engineers substituted a thinner (and, therefore, faster) wing on the AD, added more vertical tail to take care of the big, new nose, and produced a new Navy attack plane that has a top speed of 550 mph, which is as good as some of the older jet fighters still in service (the Lockheed F-80A and B, the North American FJ-1 *Fury* and the McDonnell FD-1 *Phantom*). Because the T-40 is made up of two T-38 gas turbine engines, one of the engines may be shut down while the other powers the airplane at cruising speed, thus almost doubling its range! No word about orders yet—that must await the outcome of actual service testing of the new engine—but Navy has already specified three prototype planes for testing and 10 service evaluation models, and that means the Navy is plenty interested!

SOME TIMES IT pays to give up your convictions and Bell Aircraft Corporation is proof of the value of such changes. The helicopter designers have been divided into three strong camps from the first: (1) Bell, Sikorsky and Hiller, advocating a single main rotor and small anti-torque rotor; (2) Kaman, insisting on co-axial main rotors; and (3) Piasecki holding out for longitudinally-disposed main rotors rotating counter to each other. The battle lines have been strongly drawn and the arguments hot and heavy at technical meetings. In great secrecy, Bell designed a longitudinally-disposed contra-rotating system, entered the design in the recent Navy anti-submarine warfare competition and has come off with first prize! The big ship will be powered by a Pratt & Whitney R-2800 *Double Wasp* engine of 2,300 hp (most ever placed in a helicopter), will weigh 13,000 lbs. (heaviest ever built) and will feature rotors fore and aft (as in Piasecki's *Flying Banana* machine). The initial contract amounts to about $5,000,000 and will give the Navy its first true combat helicopter—something long dreamed of by helicopter enthusiasts. Assuredly the helicopter is growing up!

FIRST FLIGHT test installation of the long-discussed compound engine has been made in a Lockheed P2V-4 *Neptune* patrol bomber. Engine is the Wright *Turbo-Cyclone 18*, a standard *Cyclone* R-3350 to which three small turbines are added. The regular engine exhaust passes through the turbines, which are geared back into the engine. This scheme of recovering energy from the usually wasted exhaust gives the new compound engine a gain of 20% in take-off power or a 20% reduction in fuel consumption (you can have one or the other—but not both!). The P2V-4 is now in quantity production and when it is recalled that the airplane with the "old" R-3350 engine already holds the world's distance record of 11,236 miles, the new engines can stretch this to about 13,500 miles (provided you want to fly continuously for three days and nights). This means more power for getting heavier combat loads off in the *Neptune* and longer-flying for sea-search: a net gain in combat effectiveness all the way around.

WHENEVER A U.S. turbo-jet air liner is ready for flight tests, the engines are ready for it, and they bear full certification

(*Turn to page 54*)

REPORT FROM THE WEST

by Jim Saftig

AS THIS column was being written, the cream of the West's modelers were building and testing, trying to get a bit more out of their ships. The reason for such feverish activity was the Southern California Plymouth Model Meet held July 8 and 9, at Los Angeles. Out of the top bracket of fliers, nine contestants were to be chosen to compete at the finals in Detroit. Tom Engleman expected that the sites for the outdoor and indoor free flight events would be the Lighter-than-Air Naval Air Station, Santa Ana, on July 8, with the controline events at the Santa Anita parking lot in Arcadia on Sunday, July 9. The nine high-point winners will travel to Detroit in a private railroad car and will be able to have their models right with them which is definitely an ideal setup.

The *Los Angeles Thermal Thumbers,* with Andy Peterson as contest director, were slated to handle the indoor and outdoor free flight events with the *Van Nuys Valley Hawks* (John Kiener holding down the C. D. job) in charge of the controline events. The well-known *F.A.S.T. Club* were signed up to take care of the team racing events. With these men at the reins, capably helped by members of their clubs, it's certain that these eliminations should leave no wants for the contestants. We might add that the Marine Corps Air Station of El Toro promised assistance at all events held at Santa Ana.

* * *

The *Long Beach Thunderbugs* held their Annual Free Flight Contest Sunday, June 4, at Camp Haan, just east of Riverside, California. This meet was not AMA sanctioned but complied with the rules to the letter. The flying site was made up of acres and acres of stubble grass, broken by slightly rolling hills. Everyone was very happy with this type of site as there were no obstructions to splatter the crates that happened to wind-in on test and contest flights. The day was perfect and the wind was very noticeable by its absence. F. L. Swaney handled the contest director duties and his wife took care of the registrations. Russ Gass and Emmett Beaulieu took over the head timer and public address duties respectively. Results: *Class ½A*—Nat Antonelli 9:47:2; *Class A*—Nat Antonelli 14:31:5; *Class B*—Bill Cranford 16:04:1; *Class C*—Tommy Moffitt 16:17:6; *Open Sweepstakes*—Tom Nishimoto; and *Jr. Sweepstakes*—John Bollinger and Les Bartlett.

* * *

Myrtle "Mom" Robbers and Harvey "Pop" Robbers are keeping us well informed about the many fine contests held up in the northern part of California. We have a report on two very fine controline meets that were held in Hayward by the *Flying Kilroys*, of Hayward, on June 11, and one by the *Martinez Aero Modelers* on June 18. It is interesting to note the many different clubs that compete and the classes that are flown. Due to the fact that there are so many different classes in these meets, we will list only the first-place winners. Mom and Pop did a wonderful job as usual, in tabulating and helping with the direction of these contests.

Results of the *Flying Kilroys'* Meet, June 11: *Precision Class AB Expert* (19 years and over)—John Lenderman 371 pts.; *Advanced*—Steve Marciel 310 pts.; *Beginner*—Abel Branco 295 pts.; *Class CD Expert*—Rober Bowmer 357 pts.; *Advanced*—Alvin Kisling 369 pts.; *Beginner*—Rudi W. Aron 288 pts.; *Class ABCD Novice*—Jack Mansfield 89 pts.; *Class ABCD Women's Event*—Margie Eckstein 100 pts.; *Exhibition Scale Event*—James Smith 346 pts.; *Class AB Expert* (under 19 years)—Eugene Stiles 370 pts.; *Advanced*—Bob Costanza 309 pts.; *Beginner*—John Ferandin 328 pts.; *Class CD Expert*—Eugene Stiles 388 pts.; *Advanced*—Truman Humphries 300 pts.; *Beginner*—Teddy Lichti 296 pts.; SPECIAL EVENTS. *Mouse Race Counterclock*—Steve Marciel; *Rat Race Counterclockwise* — Ronald Wood; *Rat Race Clockwise*—Gail Eckstein; *Novelty*—Jim Cornwell; and *Low-Point Trophy*—Harold McCartor.

The winners of the *Martinez Aero Modelers'* Contest, held June 18: *Precision Class AB Expert*—John Lenderman 354 pts.; *Advanced*—Jack Douglas 360 pts.; *Beginner*—Sherman Bennett 291 pts.; *Class CD Expert*—Eugene Stiles 373 pts.; *Advanced*—Jack Douglas 329 pts.; *Beginner*—Charles Carr 370 pts.; *Class ABCD Novice*—Jerry Nelson 114 pts.; *Class ABCD Women's Event*—Janyce Wood 132 pts.; *Flying Scale Class ABCD*—Dale Root 255-1/2 pts.; *Exhibition Scale Class ABCD*—Dale Root 305 pts.; *Speed Class AB Expert*—Herman Shiman 114.97 mph.; *Advanced*—Kevin Terry 105.84 mph.; *.Beginner* — Norman Wilson 105.22 mph.; *Class CD Expert*—Mark Brown 131.82 mph.; *Advanced* — Jack Friedland 137.56 mph.; *Beginner*—Bob Goldstein 113.66 mph.; *Proto Speed Class AB*—Kevin Terry 67.31 secs.; *Class CD*—Jerome Guggemos 67.74 secs.; SPECIAL EVENTS. *Combat Flying Clockwise*—Jack Douglas; *Mouse Race Clockwise*—James Freshman; *Mouse Race Counterclockwise*—Ronald Wood; *Rat Race Counterclockwise* — Lyle Sewell; *High-Point Trophy*—Eugene Stiles 373 pts.; and *Martinez Perpetual Trophy* (for contestant 16 years and under)—Bob Costanza 289 pts.

* * *

In our travels we dropped in on an ex-conductor of this column, Lew Mahieu, and his business partner Bill Cranford, at the Premium Manufacturing Company in Bell Gardens, California. Lew and Bill have been working on the new *Zeek* free flight jobs. We saw several ships that have been used for test purposes, and it looks like the boys have a very fine line of merchandise to offer the modelers. Our interest was mainly held by the ½A experimental *Zeek* that was on one of the shelves.

Les McBrayer with his *Highlander*, a team racer with McCoy 29 power—107 mph speed

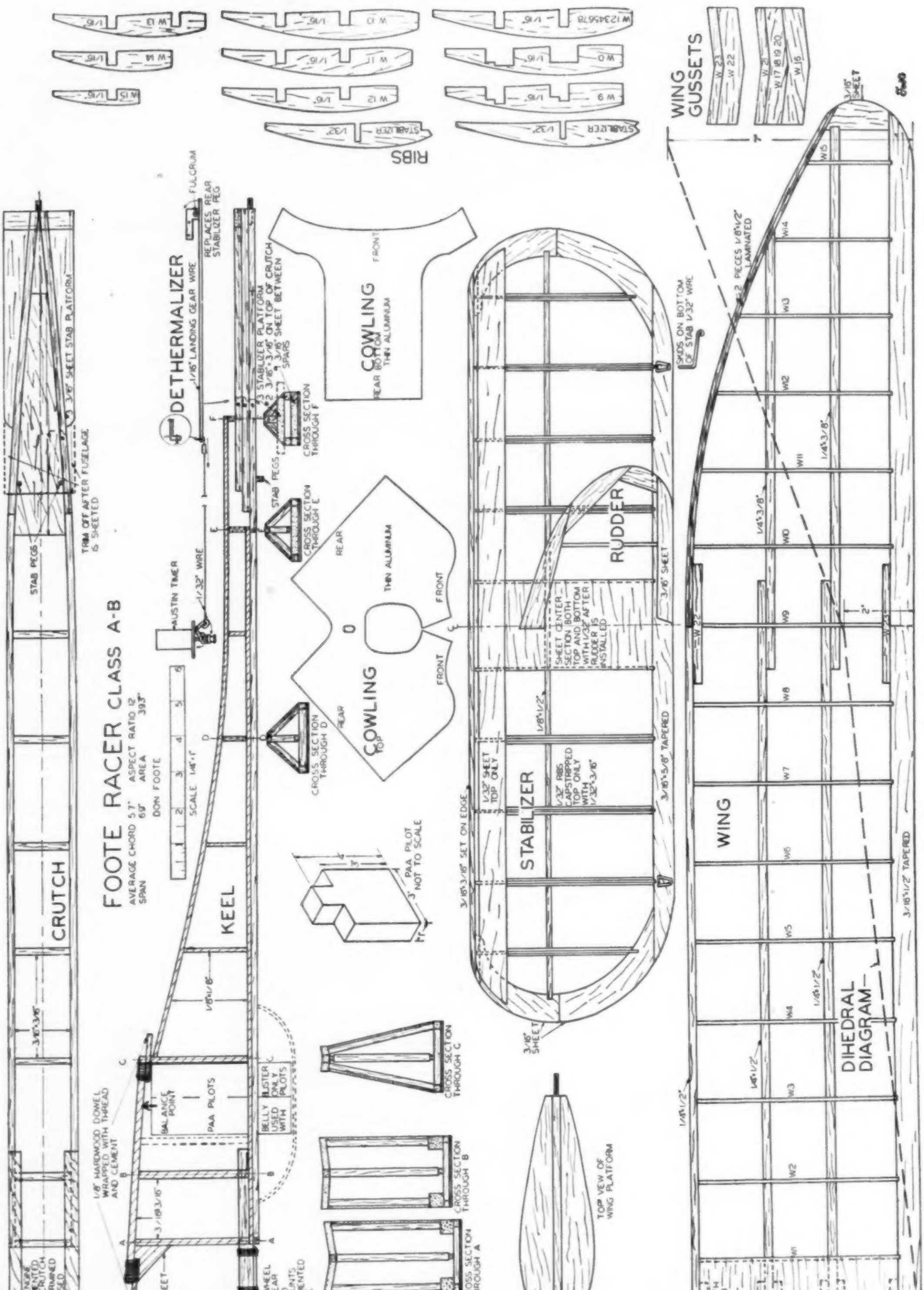
This ship weighed in at 5 oz. complete with timer, and had been flown countless times. The boys tell us that they are going to be absolutely sure all of the designs are right before they are released. From the appearance of the test models, we know they mean what they say! It looks from here as though the *Zeek* line will come out as follows: Class .19 first, ½A class next, possibly followed by an .099 job, with the rest of the classes to come later.

We understand that Richard Rigney, one of the hottest speed pilots in the business, has been attending Cal-Aero. Rigney has a couple of B jobs that have been consistently hitting around the 140 mph mark. He plans to try to qualify for the Plymouth Meet and may take in the Nats in Dallas. Wouldn't be a bit surprised to see a couple of first-place trophies on his mantle when he comes home from these two big meets.

* * *

The Redondo Beach Junior Chamber of Commerce sponsored one of the first U-control meets to be held in the Southland in many a month on Sunday, June 25. Roy "Red" Allison handled the contest director's duties. The flying site was ideally situated and four flying circles were used. Familiar faces kept popping up throughout the day as we went about our duties of photographing some of the ships that were en-

(*Turn to page* 41)



FOOTE RACER CLASS A-B
AVERAGE CHORD 5.7"
SPAN 69"
ASPECT RATIO 12
AREA 393"
DON FOOTE
CRUTCH
KEEL
STABILIZER
RUDDER
WING
DIHEDRAL DIAGRAM
COWLING
DETHERMALIZER
RIBS
WING GUSSETS

FOOTE RACER

by DON FOOTE

THE *Foote Racer* is not a new airplane. It is the final version of a ship that has been developing since 1942. In previous versions it has won many contests throughout the State of California; it missed taking first place in Class B at the big State Championships at Fresno in one year by *3 secs.* The following year the same ship took first place in Class B at the same contest with the highest time for all classes.

It has been built and flown by a large number of modelers to test its reliability and stability. All have agreed that it is one of the most stable and best-performing ships they have ever flown.

The ship has been flown with almost every Class A and Class B engine on the market. Weighing in at 20 oz., with a Class A

engine in its nose, the *Racer* is a floater beyond comparison. Because of its clean lines, the climb is still as good as that of most of the smaller Class A ships.

With larger engines, the ship becomes a racing skyrocket. Yet its super stability characteristics will roll it out of loops and spiral dives at a truly breath-taking speed. Although faster in the glide when loaded down with additional weight, its aspect ratio of 12 still insures a float beyond comparison, and it once won a Class B event at a weight of 36 oz., flying against lightly constructed ships where no weight rule was in force. This makes it an exceptionally capable airplane for the PAA-Load event, and space can be provided for a pilot for entering this event, as will be explained later.

A pop-up dethermalizer is shown on the plans and is strongly recommended to prevent lost ships. A new construction idea for the stabilizer platform strengthens the boom where most ships have a weak point.

Ignition can be installed in the space forward of the PAA-Load pilot compartment, but spark ignition is not recommended, especially in Class A ships, because of the additional weight.

Care should be used in selecting the wood. All 3/16" sheet should be soft. Spars should be fairly hard stock, and 1/16" sheet and 1/32" sheet should be medium. When building for the larger engines, harder wood should be used all the way through, and especially in spars. When building for smaller engines, soft wood can be used for all purposes except for spars, where a medium grade should be used.

The crutch is built first and is constructed flat on a board. The maple engine mounts are cemented in place on top of the crutch. A piece of 3/16" sheet is cut to fit between the spars at the tail. See #1 in crutch, keel, (or side view) and cross section through F.

The crutch is further strengthened at the tail by two pieces of 3/16" x 3/16" laid on top of the crutch spars. This is shown as #2 on the plans.

A piece of 3/16" sheet, (#3 on the plans), is cemented on top of #2 to form the platform for the stabilizer. Notice that the grain of this piece runs parallel to the crutch except at the very tail, where an additional piece is set in with the grain running crosswise. Notice too, that the stabilizer platform runs into the fuselage beyond the point where the front of the stabilizer will rest, strengthening this usually weak point. After the fuselage is planked, the protruding part of this platform will be trimmed off.

The shaded portion, only, of the keel is built next. The hardwood dowel wing pegs are wrapped with thread and cemented in place before the piece of 3/16" that they are fastened to is cemented in place.

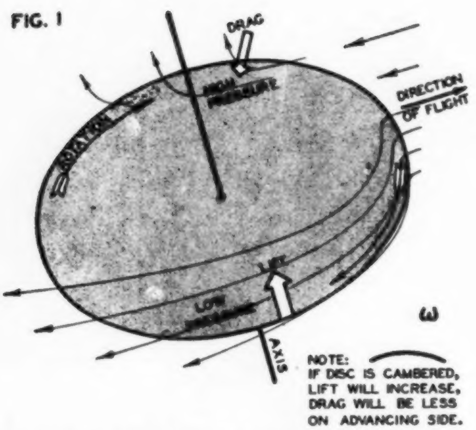
After the keel has dried thoroughly, it is removed from the board and cemented in an upright position along the center line of the crutch which is still pinned down to the board. The two pieces which form the wing platform are cut to shape and cemented in place at the slightly V'd angle shown in cross sections A, B, and C, so that they will fit the wing dihedral. The uprights which form the rectangular shape of the cabin and triangular shape of the boom are cemented into place. Notice that these pieces are set in 1/16" at the cabin and at the lower end of the triangular boom, but they are flush with the top of the keel. This is to allow for the 1/16" sheet with which the sides are covered. Although it is possible to cover each side with a single wide plank, it is easier to use a piece of two-inch stock the full length, then cut another piece to fit the remaining gap. The fuselage is left pinned securely to the board until after it is planked and the cement is dried in order to insure a straight fuselage. After it is removed from the board, the bottom is planked.

The protruding part of the stabilizer platform is trimmed off, and the fuselage sanded smooth, then covered with paper. The stabilizer pegs are cemented into holes drilled in the positions shown. The front pegs are on the bottom of the fuselage and are placed so that if a dethermalizer is used, no springs or hinges are necessary.

It is the greatest of folly not to use a dethermalizer on the *Racer*. The dethermalizer shown in the plans is designed to fit along the bottom of the ship and provides for an advantageous leverage to take the strain off the *Austin* timer. The 1/16" landing gear wire takes the place of the rear stabilizer peg. It is fastened to the bottom of the ship by two pieces of aluminum sheet which form a fulcrum. The tie-down rubbers are fastened from one of the forward pegs, over the stabilizer, around the wire, and back over the stabilizer on the other side of the rudder to the other forward peg. When the dethermalizer is

(*Turn to page* 38)

FIG. 1



AERODYNAMICS OF THE DISC

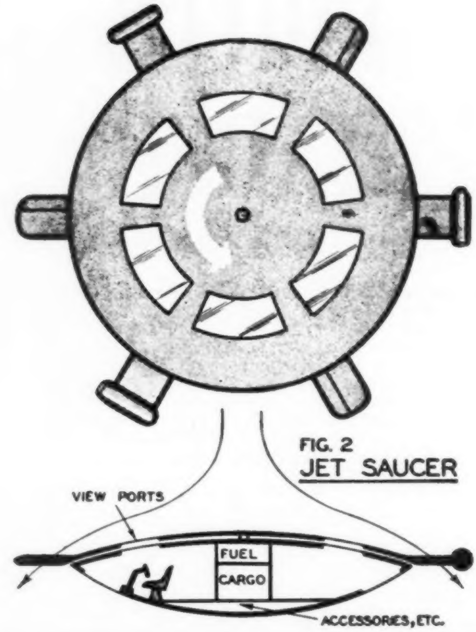
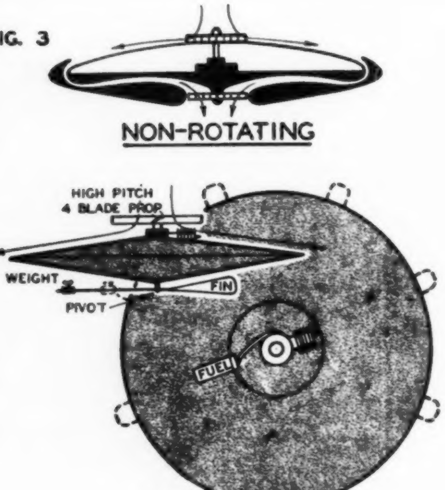


FIG. 2
JET SAUCER

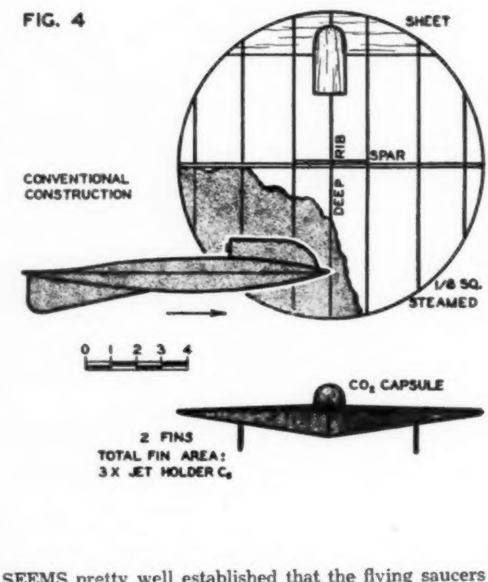
FIG. 3



NON-ROTATING

ROTATING
(MODEL)

FIG. 4



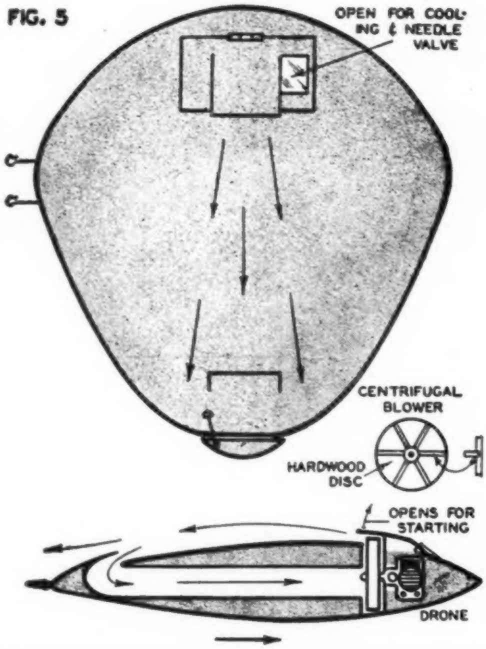
FLYING SAUCER DESIGN

IT SEEMS pretty well established that the flying saucers which so many people have claimed to see, do exist. Reports from many competent observers cannot be dismissed as mere hallucinations. Just who makes the flying saucers, that is, where they come from, is an interesting subject of speculation, but of less interest to us as model designers than the possibilities of the type.

The advent of the phenomena is a great spur to invention, and probably without parallel in mechanical history. Here, for the first time, we have the proof of the pudding without the eating. They work, but good. The next question is: what are the possibilities of this type from a model builder's standpoint?

Before we go any further it seems well to point out that there are flying saucers, and then again there are *flying saucers*. Events will probably show that the present crop of ultra-fast, highly maneuverable discs are not secret Air Force or Navy tests, Russian guided missiles, nor the work of some genius in a desert laboratory. There is a very accurate method of making this de-

FIG. 5



by ROY L. CLOUGH, Jr.

Have YOU seen a flying saucer? Well, if not, study up on their design, and build your own

termination. We must not lose sight of the fact that the air is filled with a great many queer looking aircraft these days, and mistakes as to type are fairly easy.

We see, also, another, perhaps more understandable aspect of this phenomena: persons who may have designed, or hypothecated a design remotely disc-shaped, immediately come forward as "originators" of the flying saucer concept. With a few notable exceptions these claims are specious. Saucer, disc, annular, revolving and circle wings date from the earliest infancy of the airplane idea, as a bit of research at any well-stocked library will reveal.

Speaking from an extensive experience in designing model aircraft, the writer is inclined to believe that some form of discuss-shaped aircraft will eventually replace our presently popular cruciform and flying-wing designs. There are many sound reasons for this belief. First, the shape is structurally economical. Second, it can be entirely functional. Third, it makes a lot of sense in the light of what we already know of the functions of lift and streamlines. Fourth, and most important, it makes possible the combining of all desirable characteristics in one machine.

In short, properly designed, a flying saucer would be both helicopter, autogiro, glider, and a faster-than-usual airplane. It could take off and land vertically, fly in any direction, accelerate at a great speed and slow down with equal facility. All these desirable characteristics are obtained, not as one might think, by complication—but by simplification. A disc ship capable of combining and exceeding the performance of anything in the air today (conventionally speaking) would require fewer parts than the simplest lightplane. The flying disc is the near-ultimate* in aircraft design.

Have you ever skipped a flat stone across the surface of a millpond? Spat—spat—spat, it ricochets, until losing momentum, it sinks. Have you ever "scaled" a tin can cover with a rapid spinning motion and watched it soar aloft, high in the air before tumbling to earth? Or, perhaps, as a model builder inspired by the Zimmerman *Pancake* plane, or reports of spinning saucers, you have tried to duplicate these machines in model form. What happened? Depending upon how far you pursued the idea you may or may not have discovered the truly remarkable low-speed characteristics of the Zimmerman type and the promising, but puzzling actions of the spinning disc.

A spinning disc has often been suggested as a good wing, a good method of obtaining lift. It has been argued that the spin would induce gyroscopic forces which would stabilize the flight. This line of reasoning, without the appendage of certain qualifying statements, is largely fallacious.

Cut a 6" disc of fairly heavy cardboard and take it out into a vacant lot. "Scale" it several times, up wind and down. Try to get the "feel" of what happens. Note this carefully: no matter how level one tries to release the spinning disc, the result is the same. It always tips over. Why? Since it is spinning rapidly it would seem that considerable gyroscopic forces are being set up, and that these forces should hold it in the same plane, but this isn't the case. Increasing the rotational speed only makes the disc turn over quicker. Since gyroscopic action *is* present and *should* stabilize the disc we know that some other factor must be present.

The reason for this behavior is bound up with the Magnus effect. It is similar in operation to the effect produced by a Flettner rotor (See "*Theory of Rotorplanes*," M.A.N. May, 1949). As you will notice, it is the receding side of the spinning disc which rises, spilling the disc into a sort of dive toward the advancing side. This is because the retreating part of the disc is accelerating air backward, creating a low-pressure area, hence lift. The advancing side is piling up air on itself, producing a high pressure area and considerable drag.

Thus, while it is true that a spinning disc creates lift, there is also another side to the story, for the lift is generated chiefly on one side (not one half, but about two thirds of the retreating side).

Before we leave Fig. 1, for a look at the spinning saucer type aircraft in Fig. 2, let's briefly inject a word about single-rotor helicopters. One of the big problems in obtaining forward flight with machines of this type stems from the fact that the advancing blade produces more lift than the retreating blade, because the advancing blade has the speed of forward flight added to its rotational speed. This necessitates the use of cyclic pitch control which flattens out the advancing blade and increases the angle-of-attack to the retreating side in order to balance out the aerodynamics of the machine. This is a limiting factor upon the theoretical top speed of conventional helicopters, for there comes a point where it is not desirable to decrease the angle of the advancing blade any more, and increasing the angle of the retreating blade will not produce more lift. At present day rotor speeds, this complex of snafu draws the line for most types at around 150 theoretical mph.

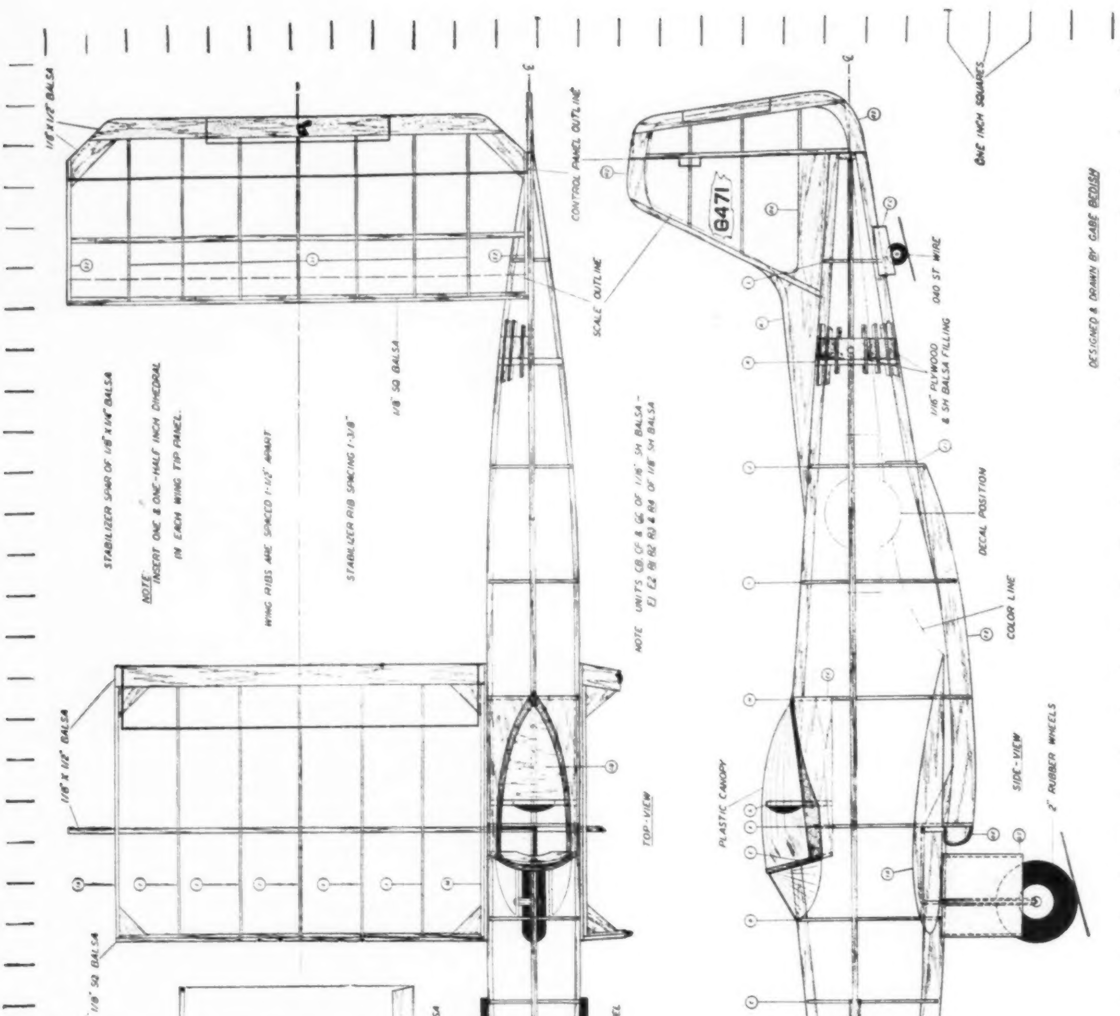
With this in mind, let us look at Fig. 2. This machine is basically a disc of symmetrical streamline cross section with the upper half of the disc free to rotate. This part is revolved at high speed by means of jet or rocket motors alternately arranged upon short stub-wings, or rotor segments, which rim the periphery of the rotating disc. The idea here is to hit a nice balance between the lift of the retreating disc-portion and the lift of the advancing rotor portion. No articulation is needed nor is cycloid control a requisite for forward flight. Some sort of cyclic pitch, however, would probably be a more desirable maneuvering control than merely C.G. shift; but some pretty good arguments could be made out for this very simple method, at least in small machines.

Downward visibility would be excellent. Vision upward would require the use of "shutter vision" by means of transparent segments in the disc opposite those in the hull. Vision would flicker to some extent, but the problem is not insurmountable. It should be possible for a machine of this type to hover with the expenditure of considerably less power than a helicopter of conventional design. This is because of the action of the disc when rotating, this action being similar in function to a centrifugal blower, inducing a large low-pressure area on the upper surface of the disc.

Fig. 3 shows a similar application of this principle. Here there are two possibilities—one, that the disc rotate as above, the other that the disc does not rotate, but obtains its lift by means of a strong current of air set in motion across its upper surface by means of some sort of blower arrangement. The important thing to remember here is that lift is not dependent upon the forward speed of an aircraft, but upon the speed of the air flowing over its lifting surfaces. The Custer channel wing plane makes use of this principle. The last information the writer had on the Custer planes indicated they were taking off at less than 20 mph. This is merely a matter of engineering proportion and horsepower and eventually they will be taking them off the ground straight up. The Custer approach to direct lift substantially anticipates the "suction" saucer type of aircraft you will see built in a few years, despite the seemingly radical differences in planform and general layout. Model

(*Turn to page* 46)

*I said "near-ultimate." It will one day be supplanted by another type of aircraft, but not until our knowledge of electro-magnetics is considerably expanded. I hope, at a later date to expound further upon this true "ultimate" machine.—AUTHOR.


NORTH AMERICAN
F-82F
"TWIN-MUSTANG"
DESIGNED & DRAWN BY GABE BEDISH
ONE INCH SQUARES
1/8" X 1/2" BALSA
CONTROL PANEL OUTLINE
SCALE OUTLINE
8471
040 ST WIRE
1/16" PLYWOOD & SH BALSA FILLING
1/8" SQ BALSA
STABILIZER SPAR OF 1/8" X 1/4" BALSA
NOTE INSERT ONE & ONE-HALF INCH DIHEDRAL IN EACH WING TIP PANEL.
WING RIBS ARE SPACED 1-1/2" APART
STABILIZER RIB SPACING 1-3/8"
NOTE UNITS CB, CF & GC OF 1/16" SH BALSA - E1 E2 R1 R2 R3 & R4 OF 1/8" SH BALSA
DECAL POSITION
COLOR LINE
TOP-VIEW
PLASTIC CANOPY
SIDE-VIEW
2" RUBBER WHEELS
EXHAUSTS OF 1/4" DOWEL
1/8" SQ BALSA
WING GUSSETS OF 1/16" SH BALSA
1/8" X 1/2" BALSA
WING SPAR TAPERS TO 1/4 INCH AT TIP
WING PANEL VIEW
DECAL POSITION
THREAD AND CEMENT BINDING
WING & LANDING GEAR MOUNT ASSEMBLY

TWIN MUSTANG

★★

by GABRIEL BEDISH

OPERATIONAL strategy utilized by the USAF for interception and destruction of hostile aircraft is still almost entirely dependent on the application of fighter plane technique.

Of these highly developed techniques, the most detailed and complex is that employed for the all-weather fighter. Experience gained from the past has revealed the dire need for a fighter unit capable of insuring air defense at night, in inclement weather, or under other adverse conditions where normal fighter plane units could not adequately cope with the situation.

The primary aircraft employed by these units today is the North American F-82 *Twin-Mustang*. This aircraft supersedes the Northrop F-61 *Black Widow*.

Contrary to the popular conception, the *Twin-Mustang* is not the result of the joining of two F-51 *Mustang* aircraft together by a single wing and stabilizer panel, but is the resultant of an entire newly-planned design. The F-82 has established a most enviable record in operational use since its inception. An early version, the renowned F-82B *Betty Joe* was flown non-stop from Hawaii to New York City in 14 hrs. 37 mins. in February, 1947.

The "F" series of this aircraft is powered by two Allison V-1710 liquid-cooled engines of 2,250 hp each. These power plants are equipped with water injection facilities for additional power output. Employment of exhaust flame dampeners prevent sighting of the aircraft at night from exhaust trails.

Armament installed varies with the mission involved. The aircraft is among the most versatile now in USAF operational service. It is employed in the capacity of a long-range bomber escort, ground support fighter, and all-weather and night fighter. The F-82F is mainly utilized in the latter category. Normal armament consists of six .50 caliber machine guns mounted within the center section wing panel. Provisions to handle such optional implements as the *Holy Moses* 5 high-velocity rockets are allowed for in the design.

Other general specifications are: *Wingspan*—51' 4"; *Fuselage Length*—38' 1"; *Combat Weight*—30,000 lbs.; *Service Ceiling*—40,000'; *Normal Combat Range*—1,500 miles; *Maximum Speed*—In excess of 475 mph; *Take-off and Landing Speed*—150 mph.

Radar equipment for combat operations in poor visibility is carried in a specially designed pod. This housing is slung beneath the wing center section. The forward extremities protrude ahead and underneath of the propeller arcs to remove propeller interference from radar screen scope operation.

Pilots of all-weather fighter units are among the most highly trained and skilled available. The demands upon the emotional and physical qualities of these pilots are so extreme that rigid standards must be maintained in their selection. Pilots are seated within the left fuselage and radar operators in the right on the F-82F.

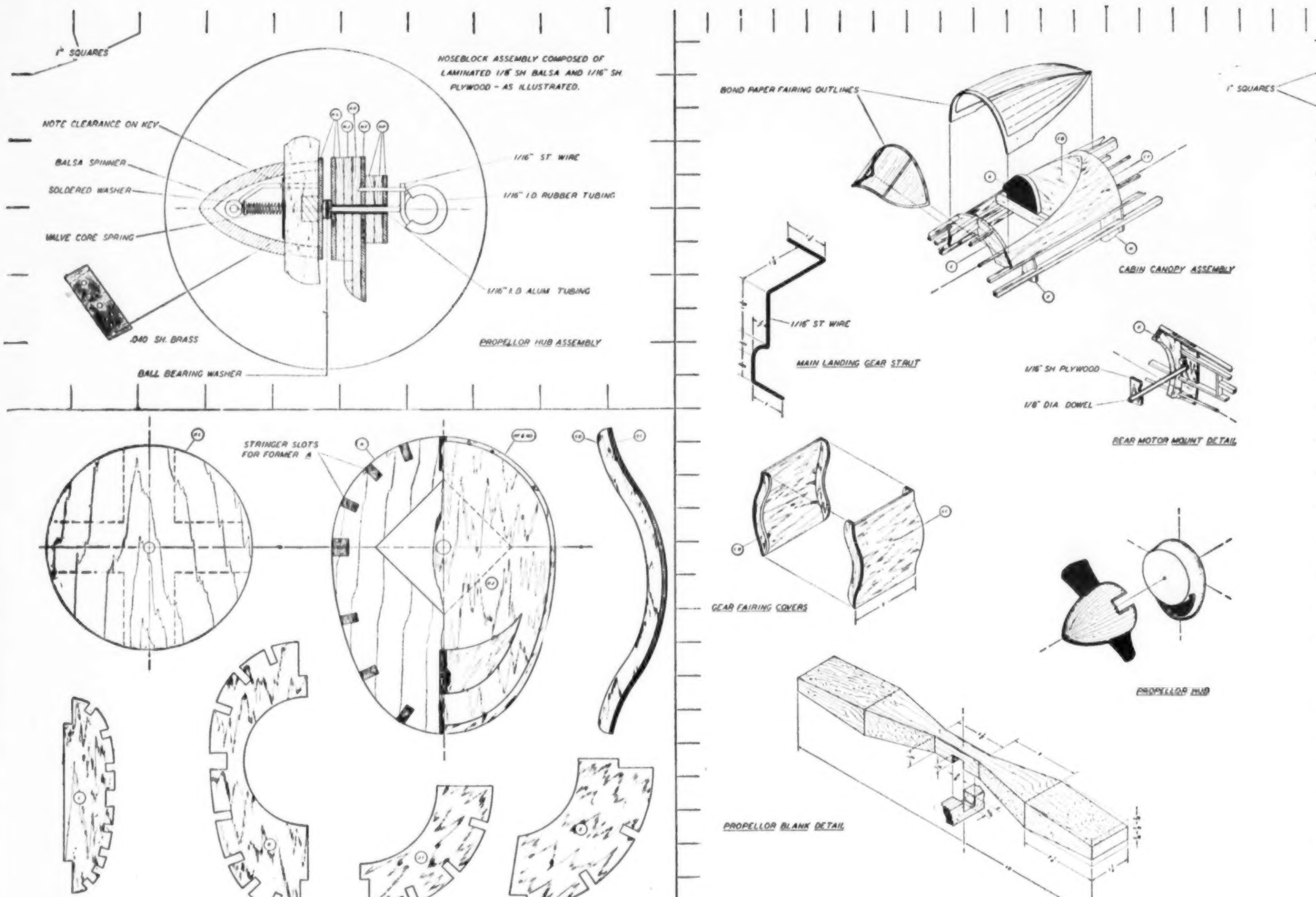
Adapting the F-82F *Twin-Mustang* to rubber-powered free flight proved to be a most intriguing experience. Certain problems inherent in the design of the prototype had to be overcome before automatic stability was insured in the model. In spite of slight changes made, a very high degree of scale fidelity was maintained in the model. Proportions relating to the stability of the model on its lateral axis were ideal and no change was required. Additional rudder and stabilizer area were needed to increase spiral stability. Lateral stability was increased by the placement of a light, lifting airfoil in the stabilizer surface. No torque compensation is needed in adjusting the model. Use of counter-rotating propellers eliminates torque reaction.

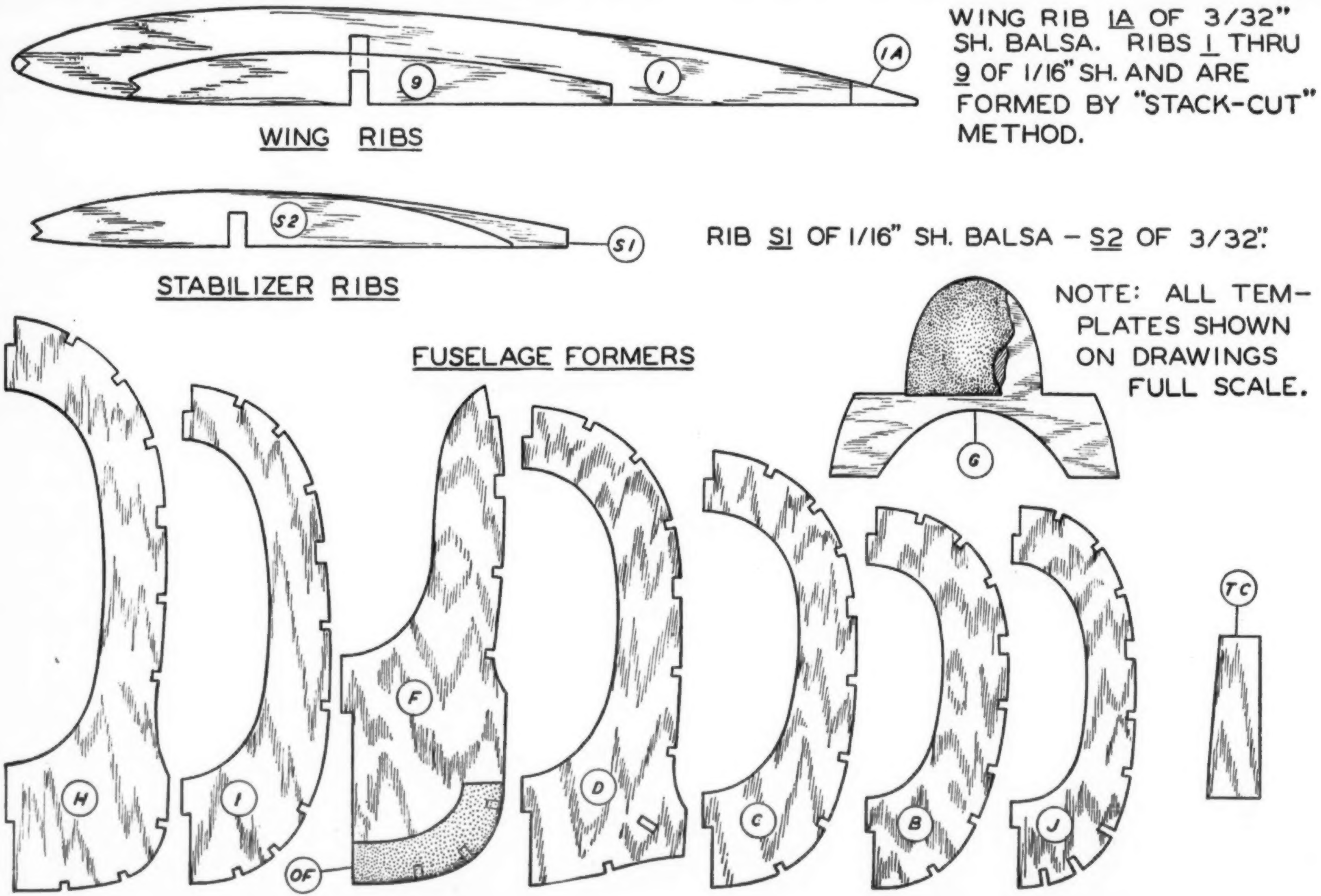
Construction of the model. By logical planning, construction time required in assembling the model was kept to a minimum. Because weight factors were displaced from the mean central axis to a considerable extent, great care had to be exercised in planning both the wing center section and stabilizer panels a.d their mountings to the fuselage units, to provide adequate strength. Orthodox types of framework construction were employed to simplify the building of the project. Keel and former type fuselage construction has proven to be one of the most consistently durable structures adaptable to flying scale model work.

The first work is that of enlarging the working drawings. Common store wrapping paper will suffice for a working surface. By connecting the dimension lines bordering the drawings, a more convenient layout for scaling may be secured. Template patterns have been presented full scale.

Fuselage Construction. Commence by preparing the required formers, profile jigs, and other structure components fashioned from medium-hard sheet balsa. Both fuselage structures are constructed of like materials and in similar fashion. First lay out the profile pieces directly over the plan and then insert the formers for one half of the assembly. Follow this operation with the positioning of stringers and wing mounting piece. The importance of using more than ample quantities of cement throughout the assembling of the model cannot be over-emphasized.

(*Turn to page* 48)


1" SQUARES
NOSEBLOCK ASSEMBLY COMPOSED OF LAMINATED 1/8" SH BALSA AND 1/16" SH PLYWOOD - AS ILLUSTRATED.
NOTE CLEARANCE ON KEY
BALSA SPINNER
SOLDERED WASHER
VALVE CORE SPRING
.040 SH. BRASS
BALL BEARING WASHER
1/16" ST WIRE
1/16" I.D RUBBER TUBING
1/16" I.D ALUM. TUBING
PROPELLOR HUB ASSEMBLY
STRINGER SLOTS FOR FORMER A
NOTE: FUSELAGE FORMERS A, IC & K OF 1/8" SH BALSA - REMAINDER OF 1/16" SH BALSA
BOND PAPER FAIRING OUTLINES
1" SQUARES
CABIN CANOPY ASSEMBLY
1/16" ST WIRE
MAIN LANDING GEAR STRUT
1/16" SH PLYWOOD
1/8" DIA. DOWEL
REAR MOTOR MOUNT DETAIL
GEAR FAIRING COVERS
PROPELLOR HUB
PROPELLOR BLANK DETAIL


WING RIB 1A OF 3/32" SH. BALSA. RIBS 1 THRU 9 OF 1/16" SH. AND ARE FORMED BY "STACK-CUT" METHOD.
1A
1
9
WING RIBS
RIB S1 OF 1/16" SH. BALSA – S2 OF 3/32".
S1
S2
STABILIZER RIBS
NOTE: ALL TEMPLATES SHOWN ON DRAWINGS FULL SCALE.
FUSELAGE FORMERS
G
H
I
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TC

DESIGN FORUM

by CHARLES H. GRANT

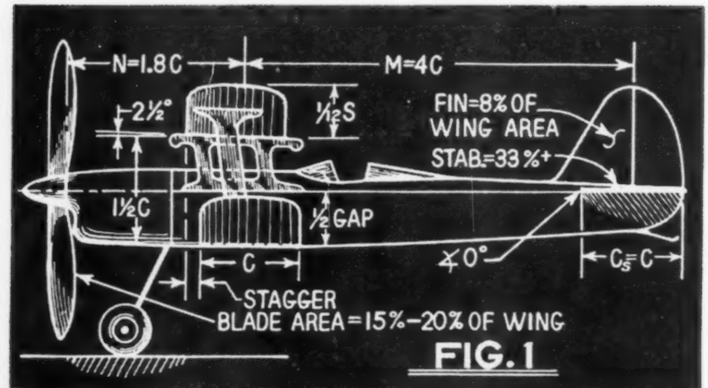


FIG. 1

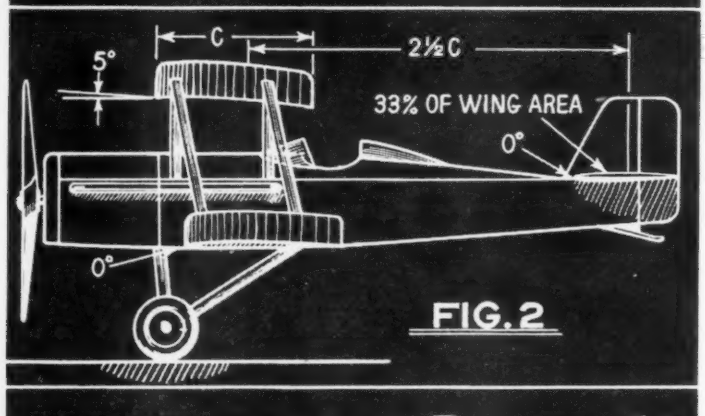


FIG. 2

FIG. 3

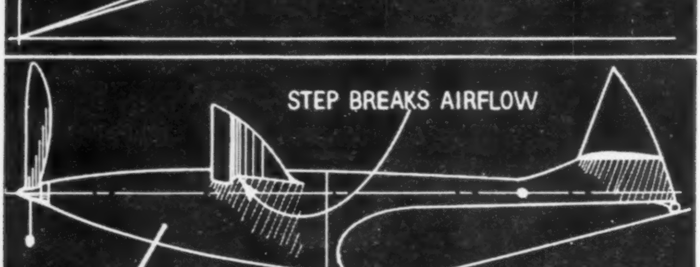


FIG. 4

FROM a standpoint of sonic speed, biplanes appear to be out of date completely. Such ships were the product of an era characterized by low-powered motors that required airplanes to have considerable wing area for their weight; an era in which drag was not so important because very high speed could not be obtained with this low power, regardless of the high drag. Biplane arrangement was the simple way of obtaining large wing area, and with strut and wire bracing such planes could be made light yet strong. This type of structure is obviously ridiculous for sonic speeds, the drag of wires and struts would practically collapse the airplane, provided enough power could be applied to force it through the air.

Nevertheless, present-day model builders are in many instances intrigued by this historic type of flying machine. They are a product of slow speeds and—so are models. The problems involved, therefore, are similar. For this reason biplanes lend themselves readily to model construction, provided they are properly designed.

In spite of this, it is possible that the biplane may find expression in sonic speed versions sometime in the future. However, these must have *internally braced* structures, without wires, struts or other drag producing elements. We may expect such designs if larger wing area, in relation to fuselage size and weight, is required for any reason. This, however, is purely speculative.

The fact remains that many of our model builders are interested in biplane design; two of them are Jack P. Swaney, of 964 Sixth Street, San Pedro, California, and Charles R. Wood, of 3002 Forty-sixth Avenue, S.W., Seattle 6, Washington. Both of these gentlemen are building and experimenting with biplanes. Apparently Mr. Swaney has constructed two biplanes which have flown successfully. However a third, an SE 5, seems to be less responsive to his persuasive efforts. He says the ship has a beautiful glide but stalls-out under power. He has tried to correct this with downthrust, sidethrust, positive stabilizer, and other tricks, which are supposed to pacify these contrary winged offspring.

To tell what is wrong with a particular model is nearly impossible because there is no way of determining the value of all the factors involved, unless you can handle and fly the model yourself. Mr. Swaney has given the facts to the best of his knowledge, but if for any reason one factor has been overlooked, it may change the whole picture. Consequently, we approach this problem in the only possible manner and give you the correct basic proportions for a reliable biplane model as shown in Fig. 1.

There are three critical elements which determine the success of a biplane more than all other factors put together: (1) the stabilizer area; (2) the fin area (these two involving stability); and (3) the area of the propeller blades, which dominates the efficiency characteristics of a biplane.

Mr. Wood, who provided us with some excellent Wakefield model comments several months ago, tells us that he has built a biplane according to characteristics previously appearing in "*Design Forum*" and which we are describing here again. He tells us that he is using a 16" propeller on a 36" biplane and says "the model flies beautifully but is not a contest winner. It makes an excellent sport job."

In light of the fact that the fin and stabilizer determine stability, we would say that Mr. Wood designed his model properly in this respect, because it flies well. The lack of contest performance appears to be due to incorrect propeller design, because a 16" propeller is too small for a 36" model. This would be sufficient for a contest monoplane with a span of 36", but if you double the wing area as in a 36" biplane

(*Turn to page* 53)

Biplanes make excellent sport and contest models—if you know their tricks

SUPER RUDEVATOR

by H. H. OWBRIDGE

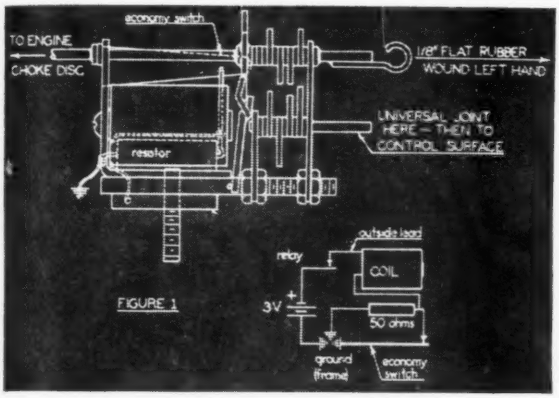


FIGURE 1

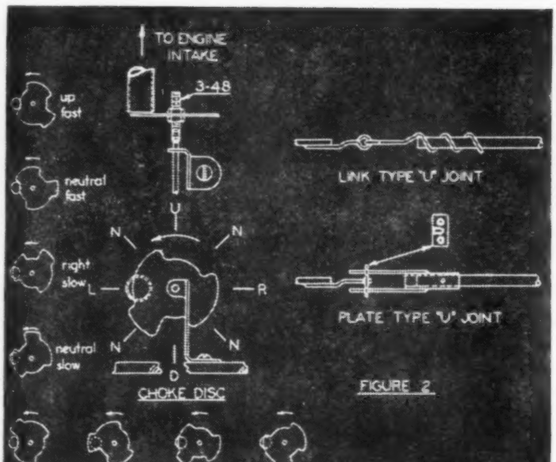


FIGURE 2

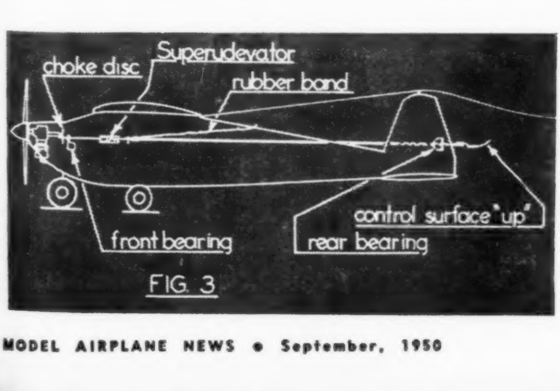


FIG. 3

RUDDER, elevator and engine control—these three have long been recognized as the ideal combination for the proper control of a model by radio, but their order of importance is not just that. On a 100% basis, their order of importance is more nearly as follows: rudder 60%, engine control 30%, and elevator 10%. Other opinions may juggle the percentages a little, but it is not difficult to agree that if radio control is to be kept simple and therefore practical for the majority of modelers, engine control is easier to get than elevator control, and much more useful.

The well-known control unit called *Rudevator* includes a form of elevator, but the only reason this type of elevator is considered worth its weight is because it can be had for practically no weight at all. We have long wished that engine control could be had for as little additional weight and complexity as this elevator control. After trying more experiments than we care to remember, the idea finally came through. The final idea is so utterly simple compared to some of the extremely fancy solutions we have tried, that the whole thing leaves us feeling somewhat foolish. When finished, it was obvious that the reason this idea wasn't thought of long before was simply because the details of flying a radio controlled model were often improperly valued in our minds. This is a common occurrence in the development of any machine, large or small.

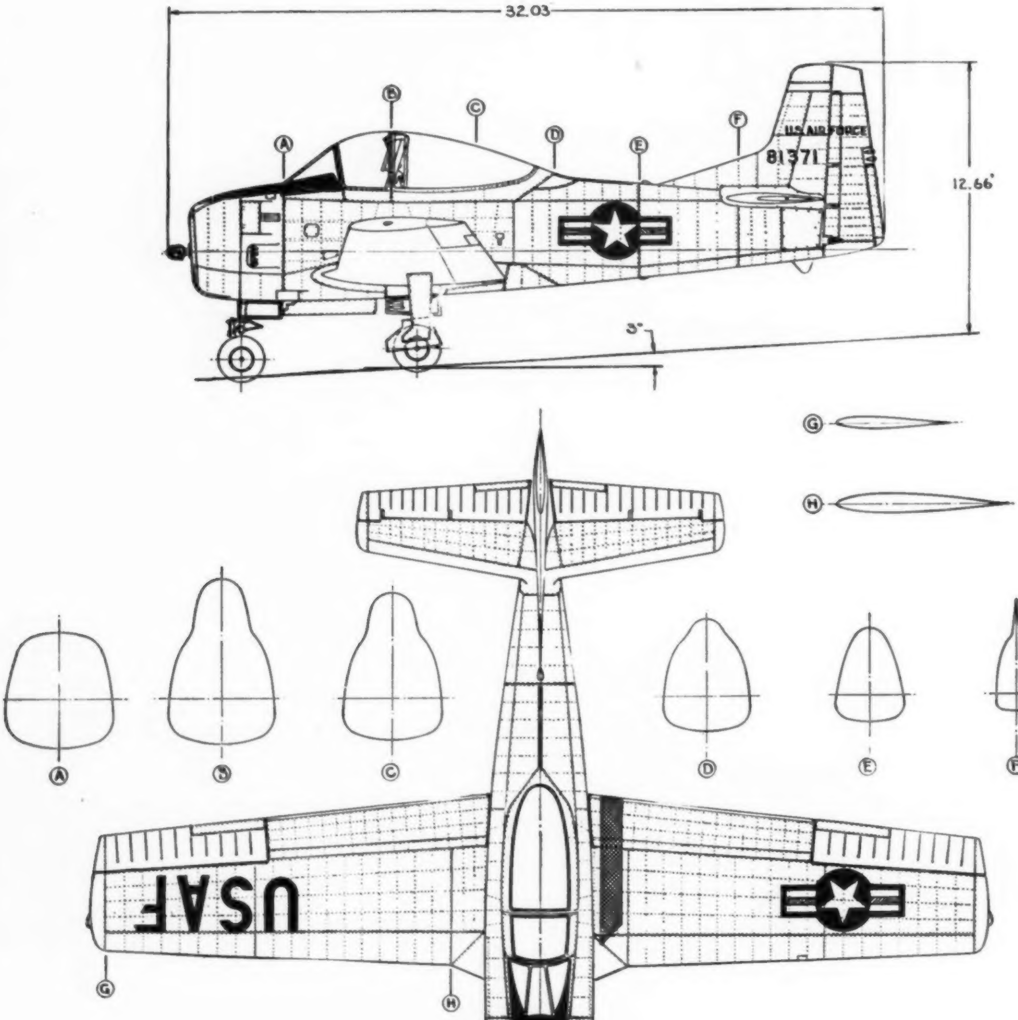
We call our new control unit *Superudevator* in order to separate it from its older brother, *Rudevator*, which had at best only an indirect means of controlling engine power. *Superudevator* gives rudder and elevator action by means of the free-floating rotary control surface just as did the *Rudevator*. But in addition, the unit also gives a two-speed engine and cutoff without the use of any additional coils, magnets, motors, switches, thermal delays, relays, escapements, valves, pressure tanks or what-have-you. We finally got the three major radio controls on one simple single-channel escapement unit that is rugged, reliable and only weighs 1 oz.

A look at Fig. 1 will show how it operates. As will be seen, the parts are the same as used on a *Rudevator* except that their positions are changed so as to give an escapement with a take-off shaft at both ends instead of at only one end. Present *Rudevator* owners can rearrange the parts themselves. Notice that the armature and the bearing plate nearest it have been cut off just above the coil core and a new armature stop has been added. The lower shaft, which used to be the rubber-powered escapement shaft, is now the control surface shaft which runs back (by extension) to the rotary control surface. The upper shaft now becomes the escapement wheel shaft and is rubber driven (by a loop of 1/8" flat) from the rear, while its front end goes forward to the engine to drive what we call a "choke disc." Let's talk generally about the unit before going into installation details. The choke disc can be stopped in eight positions—four with transmitter ON and four with transmitter OFF. So, we merely shape the choke disc to give the power control we want. Others may differ but we personally prefer full power on up, neutral after up, and down. Part power is on all other control positions except neutral after down, which we make cutoff. So a typical choke disc pattern (Fig. 2) has a single radius for part power. From this radius a cutout is made at the proper locations to let full air into the engine for full power and a bump is made (at the neutral after down control position) so that the engine will be choked dead if the disc is stopped here for a few seconds.

Referring back to Fig. 1, it will be seen that another simple device has been added to warrant the distinction, *Superudevator*. This is a very simple switch that is driven by the escapement wheel; hence it has plenty of power to be reliable. We call this a "current economizer," and it certainly is. As you know, the escapement of this unit is the self-neutralizing type which means that for Neutral, you simply turn the transmitter OFF. This is a very helpful and important point in flying a ship, but it also means that when holding a control with the transmitter ON, current is being drawn continuously from the batteries. The economizer switch really gets rid of this trouble for all time. You can literally hold a control all day on two pen cells. The escapement coil draws about 300 ma. for the first instant that the receiver relay closes. But almost immediately, the escapement wheel on the unit flies over and opens the economy switch. This forces the current to go not only through the coil, but also through a 50-ohm resistor. Thus, what starts out as a 10-ohm circuit, quickly becomes a 60-ohm circuit and current drops from 300 to 50 ma. and remains there as long as the control is held. It takes 300 ma. to draw the armature to the coil but 50 ma. is plenty to hold it there. The important thing is that the armature must get to the pole before (not after) the current is reduced. Otherwise the device would be very unreliable and difficult to adjust.

For installation details, let's assume we are putting the unit in a *Rudder Bug* or one of its many modifications, since that design is so airworthy and popular. Fig. 3 shows a *Rudder Bug*

(*Turn to page 51*)



North American T-28

Drawn By- Leonard Wieczorek

North American Trainer

by ROBERT McLARREN

IT COSTS as much as a prewar Douglas DC-3 transport, it flies as fast as the prewar Seversky P-35 first-line fighter, yet it's only the 1950 version of the Air Force training plane, which has come a mighty long way from its humble beginning. The North American T-28, our Plane of the Month, is not a primary trainer, nor a basic trainer, nor an advanced trainer; such fine lines of distinction have gone by the boards in the new postwar Air Force training program, which will be built simply on the T-28 *Trainer*, nothing more and nothing less.

V-J Day signaled the end of a lot of things but one of these was the old-style training plane. The last of these, a Boeing PT-13 *Kaydet* biplane, was delivered in February, 1945, but the North American AT-6 *Texan* continued in production right up through August, 1945. The Vultee BT-13, last of the basic trainers, went out of production in June, 1944. Thus, the stage was set for a revolution in training plane design and the jet fighter proved the catalyst. The first Air Force jet fighter, the Bell YP-59 *Airacomet*, was delivered in August, 1943, and the Lockheed YP-80 *Shooting Star* production line delivered its first airplane in October, 1944, (the world didn't know about either of these events at the time!) to begin the revolution in aircraft design.

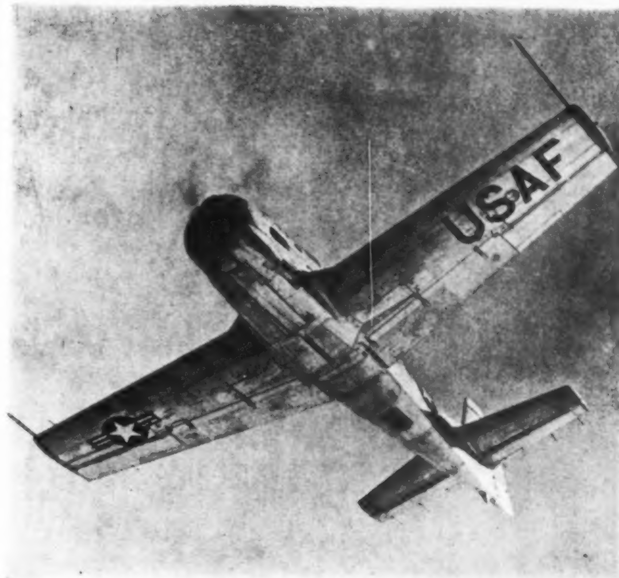
The Navy actually detected the revolution first and began design studies of "high-performance" training craft while the war was still in progress. The results of this Navy training plane advance were the Fairchild XNQ-1 and the North American XSN2J-1. Both of these were gleaming, all-metal, low-wing designs with bubble canopies, retractable landing gears and very high performance. The XNQ-1 primary trainer was powered by a 285 hp Lycoming engine, weighed 3,724 lbs. fully loaded, and cruised at 148 mph (compared with the 220 hp Boeing N2S-3, which weighed 2,717 lbs. and cruised at 106 mph). The North American XSN2J-1 was truly a broad step forward in advanced training design, the big ship being powered by 1,100 hp Wright *Cyclone* engine, weighing 8,406 lbs. loaded, and cruising at 159 mph at 10,000' (compared with the SNJ it was designed to replace, which used a 550 hp Pratt & Whitney *Wasp* engine, weighed 5,300 lbs. and cruised at 170 mph at 5,000').

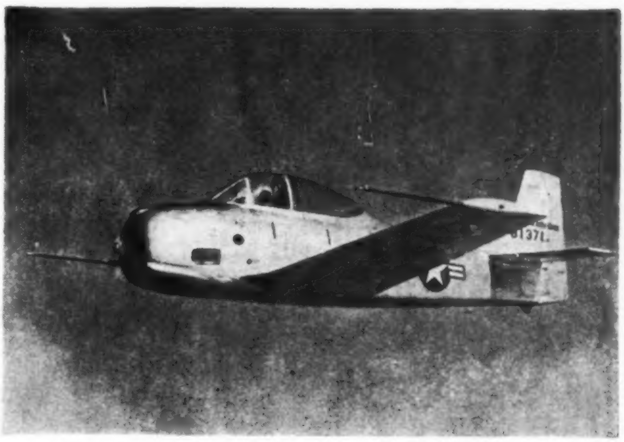
But performance was not the sole objective in these new training planes, since both were designed to bring most of the "hot" airplane features (such as armament, dive brakes, standard controls, visibility, etc.) to the training plane level. The Fairchild XNQ-1 made its first flight October 18, 1946, at Hagerstown, Md., and the big North American XSN2J-1 flew first two months later in Inglewood, Calif.—but by then the Navy had run out of money!

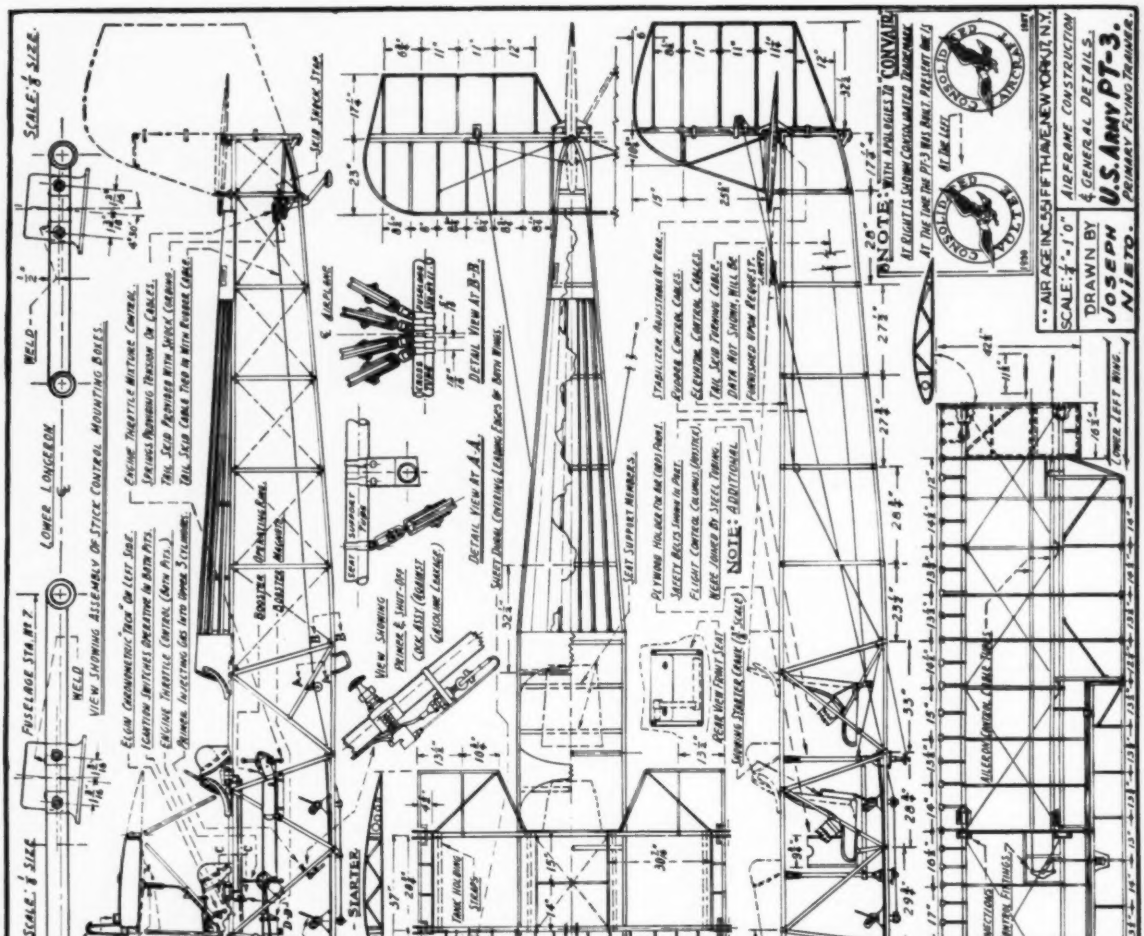
The Air Force, too, had decided that an entirely new approach was needed in the training field but, again, the budget problem loomed high in the planning staff considerations. Both branches of the service ended the war with large supplies of North American trainers (AT-6, SNJ) on hand—the Air Force had accepted nearly 10,000 of the type during the course of the war, the Navy had received 2,000! With these large supplies on hand it was a little difficult to obtain approval for any brand-new trainer purchases. But both services agreed on one thing: the biplane was through! Both declared all their "Yellow Perils" surplus, and thousands of them are now to be seen zooming in and out of the nation's crops with dusts and sprays issuing from their bellies—thus was the aerial crop-dusting profession created!

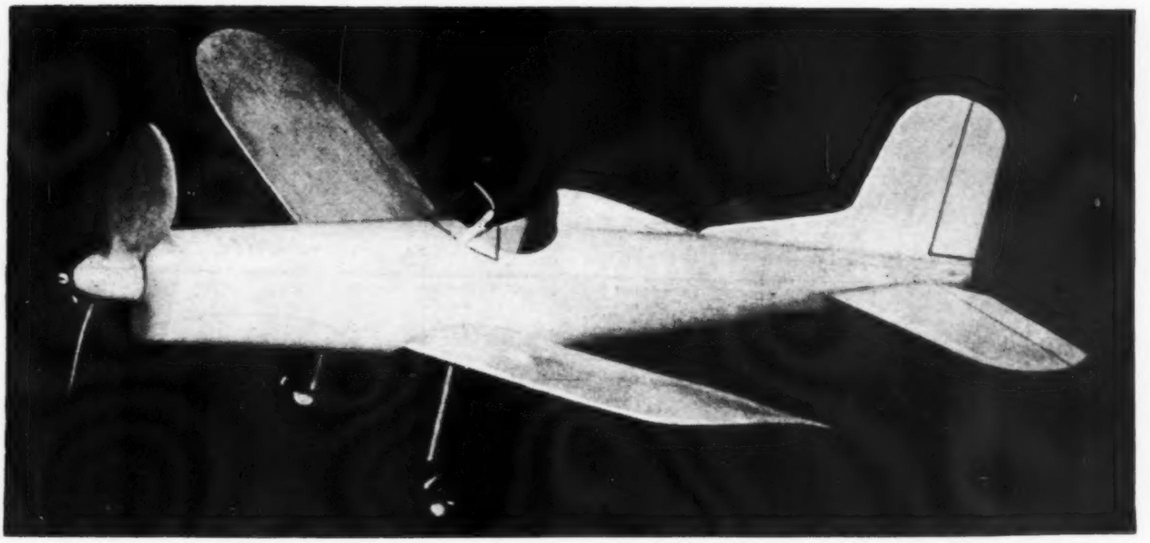
The merger of the Armed Forces centralized the training aircraft problem, and both the Air Force and Naval Aviation jointly reviewed the situation. Both agreed that the old stepping stones of "Primary," "Basic," and "Advanced" training planes were no longer required, and the Air Force experimented with a small class of students by placing them in an AT-6 for their first ride and continuing in that same airplane through advanced flight training . . . and it worked! The class graduated to combat aircraft training directly

(*Turn to page* 36)






AIR AGE INC. 551 FIFTH AVE. NEW YORK 17, N.Y.
SCALE: 1/4" - 1'0"
AIRFRAME CONSTRUCTION & GENERAL DETAILS.
DRAWN BY JOSEPH NIETO.
U.S. ARMY PT-3.
PRIMARY FLYING TRAINER.
PROCEDURE TO START PT-3
LANDING GEAR DETAIL
UPPER LEFT WING
LOWER LEFT WING
ARMY



that's the SPIRIT

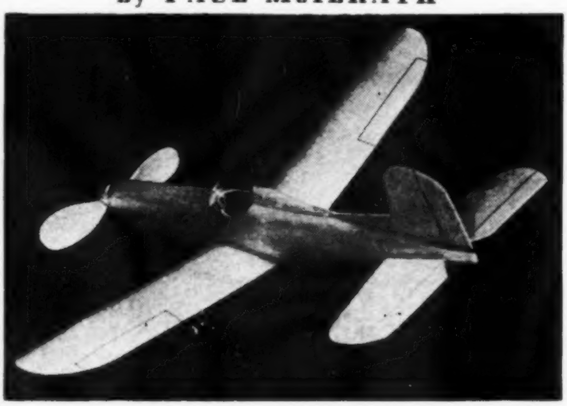
THE average modelers have known it all the time, and now even the hot shot contest boys are catching on: a plane does not have to fly 169 mph or soar O.O.S. to provide a lot of fun. A realistic ship can turn in exciting flights even if it doesn't break a record all year long.

The *Spirit* is a rubber-powered version of the semi-scale type model that is becoming so popular in the gas model field. Although it is not a thermal hound, the *Spirit* isn't any front-yard flier, either. The first power thrust will climb it over the top of a two story house, or R.O.G. it without spinning the wheels.

The *Spirit* construction is something new, and we suggest that you read the instructions carefully. Most of our space is devoted to sketches and description of these unusual features, so if you haven't built any rubber-powered ships before, look in other MODEL AIRPLANE NEWS construction articles for details of propeller carving and the like.

But don't be afraid of the job of bending sheet balsa. It is a simple process when you tackle it right. Some accurate cut and fit work is required, but all-balsa construction is still a lot faster and easier than "sticks and paper."

by PAUL McILRATH



For fuselage sides, select two 1/16" x 3" x 15" sheets as nearly identical in hardness and grain as possible. Use the flexible "A-cut" stock. You can easily distinguish it from the stiff "C-cut" by bending a 3" wide sheet over the ball of your thumb. "A-cut" will bend almost like paper, and all its surface markings are *lengthwise* of the sheet, while the stiffer cuts have a pronounced surface pattern *across* the sheet.

Before cutting out the parts, lay all the sheets flat on the work board and sand them on both sides with fine sandpaper wrapped around a block. Removing the sawmarks and fuzz makes the wood easier to handle and saves quite a little weight.

Trace and cut out the two fuselage sides. Lay them one on top of the other to be sure that they are identical. Don't cut the slot for the stabilizer yet. See that the dotted reference line and bulkhead positions are clearly marked on the inside of both pieces and the rubber peg and stabilizer positions on the outside. A 6B pencil will make a good black mark on soft sheet.

Cut one tail and two center bulkheads from 1/16" sheet and one nose bulkhead from 1/4". Trace the arrowheads on all four. These arrows line up with the dotted lines on the inside of the fuselage sides. Check with the cutaway sketch. Cement the four formers between the flat sides as shown in the step-by-step drawing.

When these joints are well dried, start with the bending: try the bottom nose seam first. Moisten the *outside only* of the nose sides with water. Leave a margin of about 1/4" around the outside edge dry so that water can't seep around to the inside. If the inside does get wet, work on something else until it dries out. When the outside is soaked and the inside dry, the sheet will bend around the formers almost by itself.

Overlapping edges will now have to be trimmed off so the sides butt together smoothly. Using a steel ruler and a sharp razor blade, trim the same amount from each edge. Careless work here can't be covered up later. Be cautious.

When the edges fit squarely, cement the seam. Be sure to cement the bulkheads, too. Lay a strip of 1/4" square along the seam and slip several rubber bands around the whole works while it is drying.

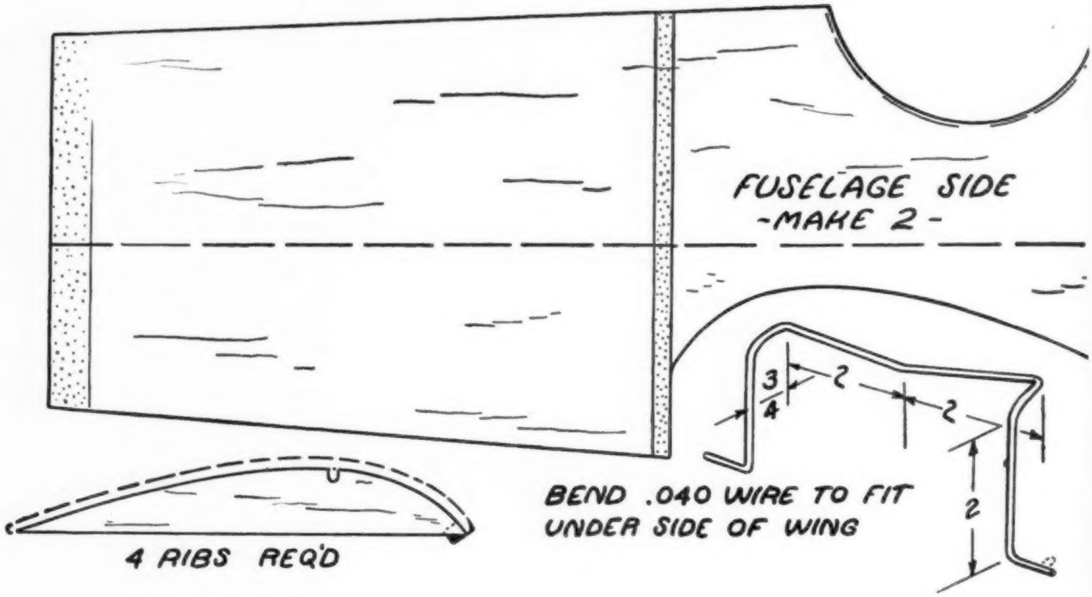
When the bottom seam is dry, use the same method on the top nose seam and the top and bottom seams of the rear half of the fuselage. Watch alignment carefully while working on these seams: a twisted fuselage is almost impossible to re-align.

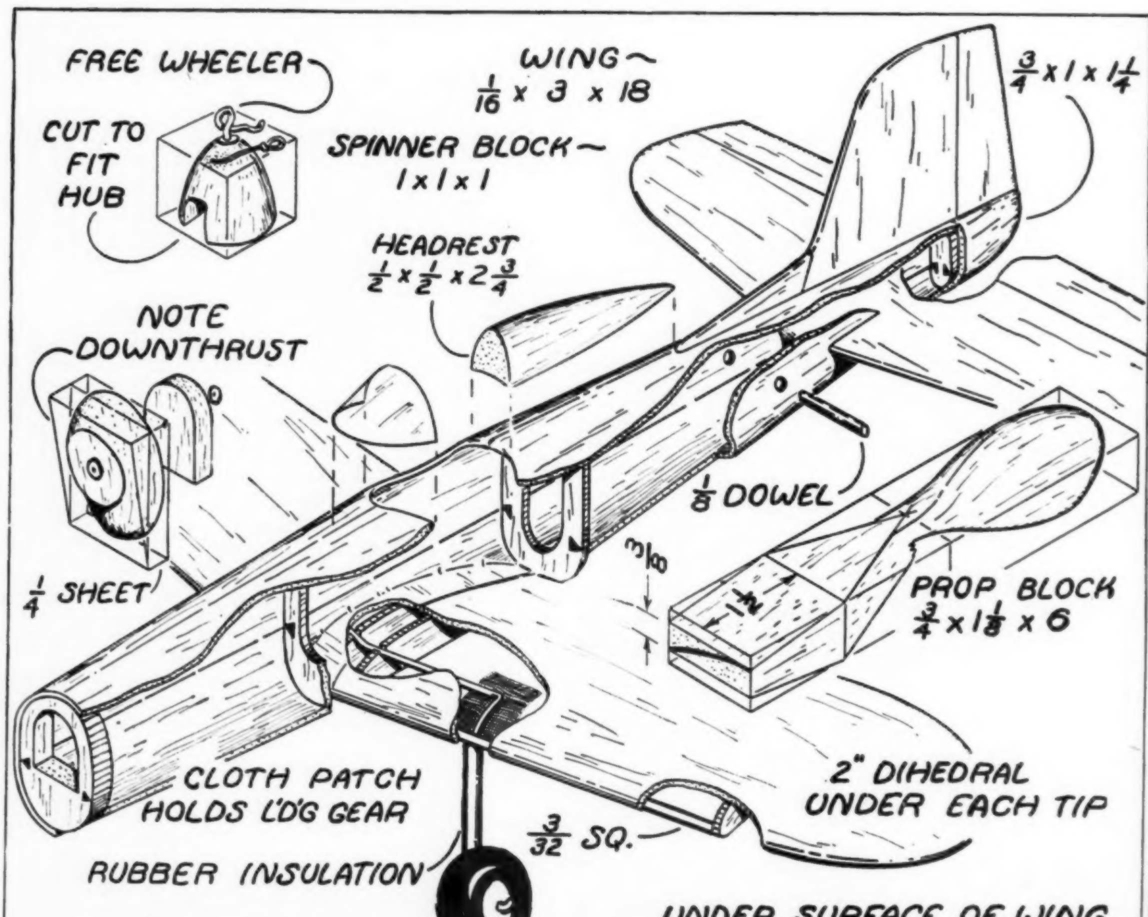
Cement a soft 3/4" x 1" x 1-1/4" balsa tail block directly to the rear bulkhead after trimming off the overhanging portion of the sides. Carve the block to blend into the fuselage lines.

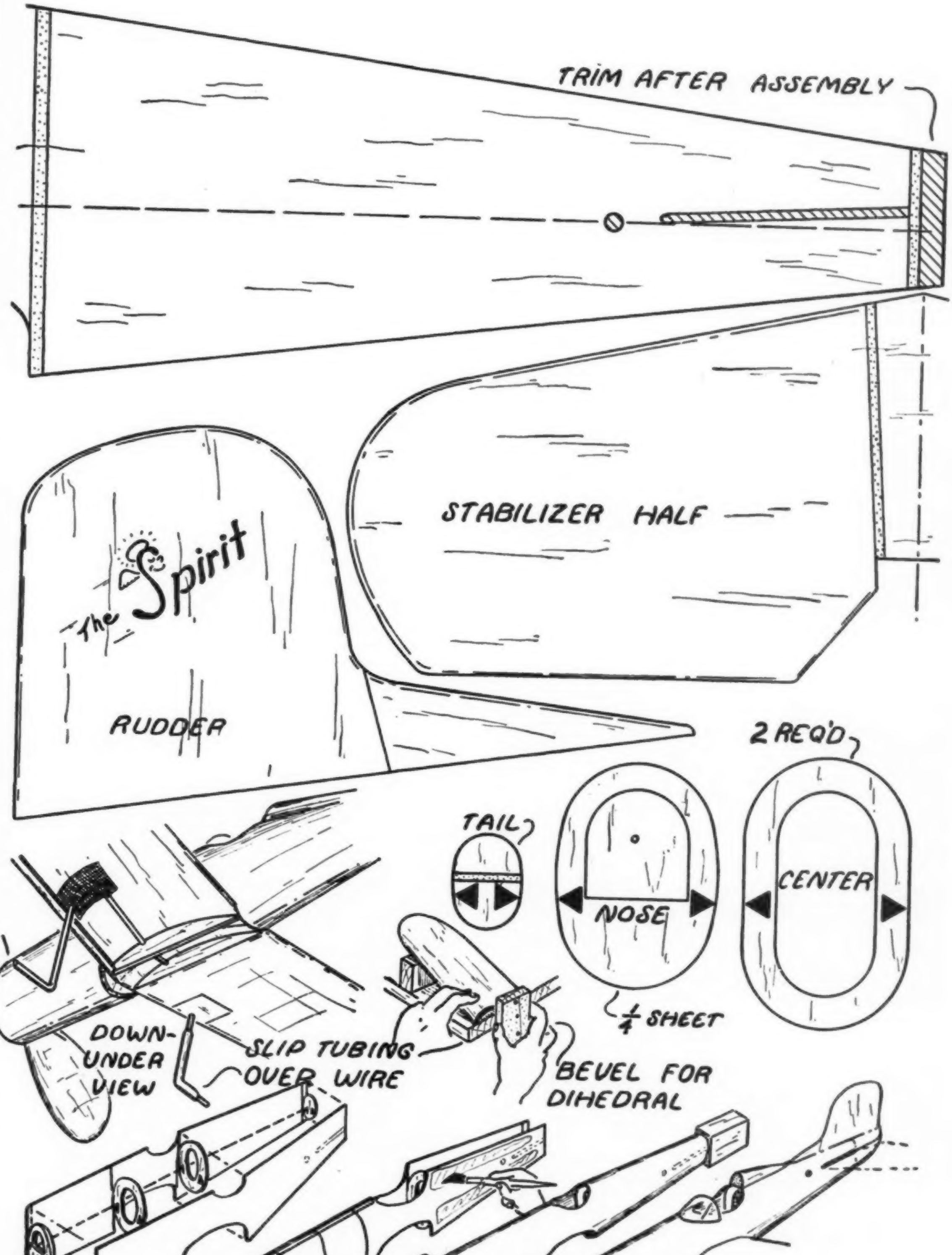
The tail surfaces are cut from sanded 1/16" sheet. The stabilizer slot is cut in the fuselage and the tail block split so the stab can be slipped into place in one piece.

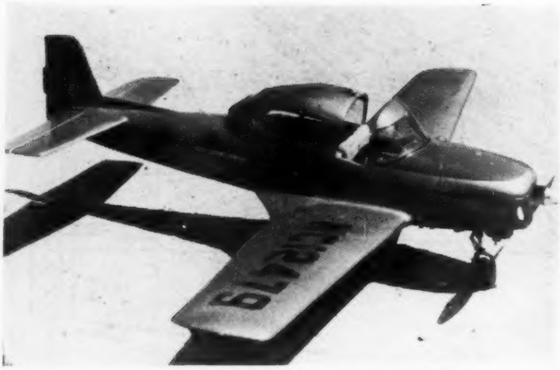
The nose block is made of two layers of 1/4" sheet and the plug from the front bulkhead. Note how the front sheet is tapered to give downthrust. Be sure to retain this downthrust angle when drilling the shaft hole.

In case you are worrying about plans for the wing, none are needed. The wing is made of two panels 1/16" x 3" x 9", with tips trimmed to any shape that appeals to you. One rib is cemented just inside each tip and one about 1/4" from each inboard end. A 3/32" square strip is glued inside the straight portion of the leading edge and then the (*Turn to page 42*)


FUSELAGE SIDE
-MAKE 2-
3/4
2
2
2
BEND .040 WIRE TO FIT
UNDER SIDE OF WING
4 RIBS REQ'D


FREE WHEELER
CUT TO FIT HUB
WING ~
1/16 x 3 x 18
SPINNER BLOCK ~
1 x 1 x 1
3/4 x 1 x 1 1/4
HEADREST
1/2 x 1/2 x 2 3/4
NOTE
DOWNTHRUST
1/8 DOWEL
3/8
1/4 SHEET
PROP BLOCK
3/4 x 1 1/8 x 6
CLOTH PATCH
HOLDS L'D'G GEAR
2" DIHEDRAL
UNDER EACH TIP
3/32 SQ.
RUBBER INSULATION
1 1/8 DIA. WHEELS
UNDER SURFACE OF WING
IS TISSUE COVERED

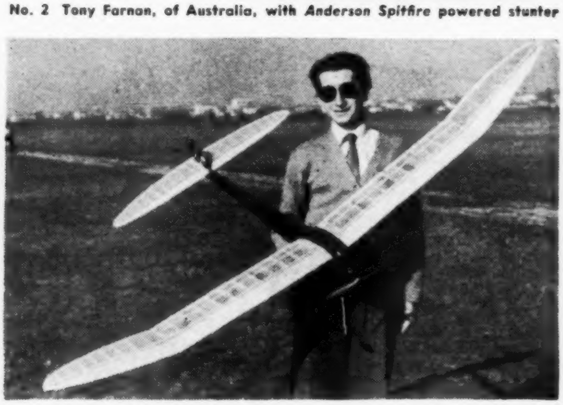

TRIM AFTER ASSEMBLY
STABILIZER HALF
The Spirit
RUDDER
2 REQ'D
TAIL
NOSE
CENTER
1/4 SHEET
DOWN-UNDER VIEW
SLIP TUBING OVER WIRE
BEVEL FOR DIHEDRAL
FUSELAGE CONSTRUCTION



No. 1 Prize-winning *Navion* built and flown by S. Estrada

No. 2 Tony Farnan, of Australia, with *Anderson Spitfire* powered stunter

No. 3 Model Martin AM-1 in realistic setting, by L. L. Cunningham



No. 4 Gianni Pavesi with a very attractive McCoy-powered free flight ship

No. 5 Burton Philpot calls this rubber job *Miss World's Fairfield*

No. 6 Ray Mercier used conventional gear on his R. C. *Rudder Bug*

Air Ways

INTERNATIONAL *JETEX* competition has been inaugurated and the first contest for a challenge trophy will be held at Fairlop Airdrome, Essex, England, on September 30, 1950. The contest will be an exclusive affair, limited to thirty entries, fifteen of which must be from overseas, and will be run on an invitation basis. Modelers who have *Jetex* ships which have made very high times, as certified by Club or AMA officials, are urged to write to Telasco Ltd. (55 West Forty-second Street, New York 18, New York) for entry blanks and contest rules. Those models chosen from this country will be sent to England at no cost to the contestant, and will be flown by proxy.

The contest will be a one-class affair, with all sizes of *Jetex* motors competing together. This is made practical by the fact that the *Jetex* fuel charges burn for a closely predetermined time and it is thus possible simply to divide the time of flight by the duration of engine run. Any further information required may be obtained at the above address.

SEND US THOSE PHOTOS! Remember that we give a free one-year subscription to every modeler who sends in a photo that is used for our "*Air Ways*" page. The requirements are not at all difficult and we suggest that you dig through that pile of pictures

News of Model Airplane Experimenters All Over the World

of your prize ships, select a few of the best, and send them in to us. If you are in doubt as to the specifications, turn to page 29, of the April, 1950, issue, where we set down in detail the whole story. Read it over and send us the photos.

THERE MAY BE a few lifted eyebrows over our article on page 12 of this issue covering the design of "flying saucers." Of course, we don't go too deeply into the construction of a soup plate that will carry you to Mars, but model circular craft offer an interesting field of study, especially to those jaded builders who groan that ". . . model aviation is in a rut . . . same old ships . . . nothing new!" As noted above, we would like some good, original photographs for "*Air Ways*," and a shot of your flying saucer might be just the "dish" we need.

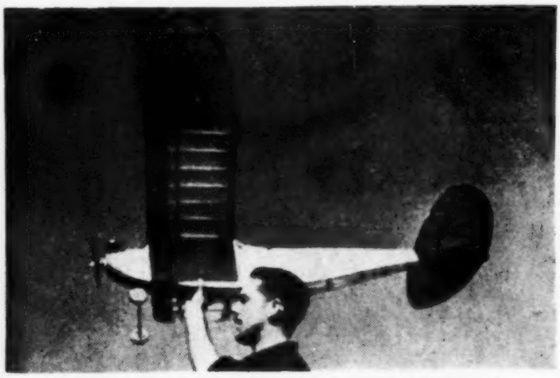
* * *

The opening photograph in this month's array was sent to us by S. Estrada (2241 East Eighty-ninth Street, Los Angeles 2, California) and shows his Ryan *Navion* scale model which has been a consistent prize winning flier, having taken many first places and a few others besides. The model is finished in Lambert gray with green trim and is powered with a K & B glow plug *Torpedo* 29. The wingspan is 33-1/4", length 27-1/4", and weight is 3-1/2 lbs. The *Navion* flies at around 50 mph and is complete with a sliding canopy, fully upholstered seats, all controls, and instruments, and a shock-absorbing landing gear. Mr. Estrada has strong ideas on the rules which should be set for the scale model event. He believes the maximum pull test should be 50 lbs., maximum scale size 1-1/2" = 1', and that scale jobs should be required just to fly and not to do any stunting.

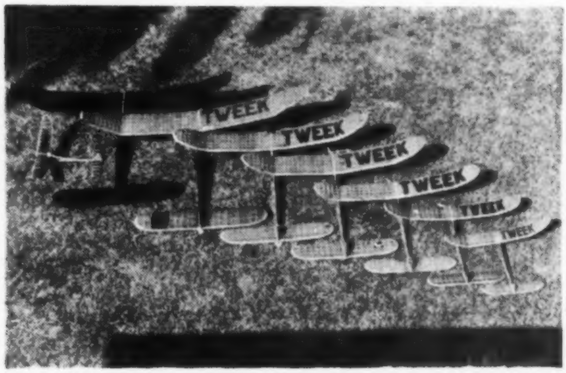
Our second picture was sent to us from Australia by Tony Farnan (18 Killara Avenue, Hartwell, Melbourne, Victoria) and we see Tony holding a stunt model which is powered by an *Anderson Spitfire* engine. He won the 1950 Victoria State Championships with this plane.

The very realistic Martin AM-1 *Mauler* in photo No. 3 is the work of L. L. Cunningham (P. O. Box 243, Chico, California). He tells us that the ship has a span of 37" and is an exact flying scale model, aside from the fact that the diving flaps, tail wheel covers, and rocket racks were omitted. He took all his

(*Turn to page* 43)

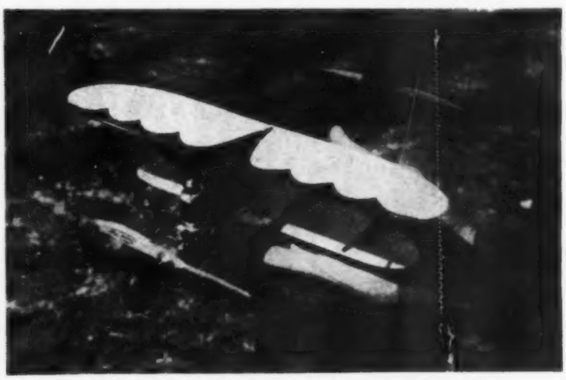


No. 7 A South American Gismoe held by owner Aldo Berardi

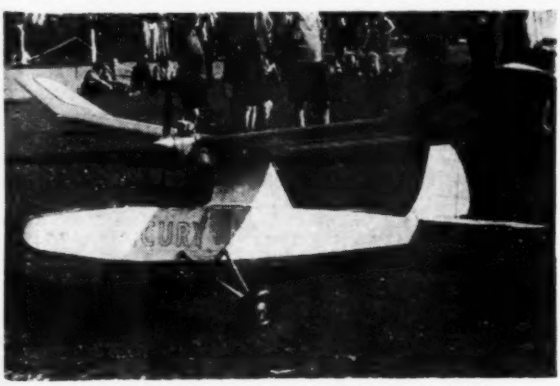


No. 8 Myron Garday is responsible for this impressive display of Tweeks

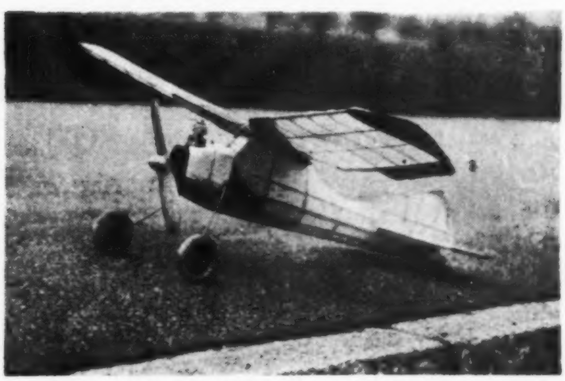
No. 9 A really beautiful scale Cessna 195 by Tinsley and Burroughs



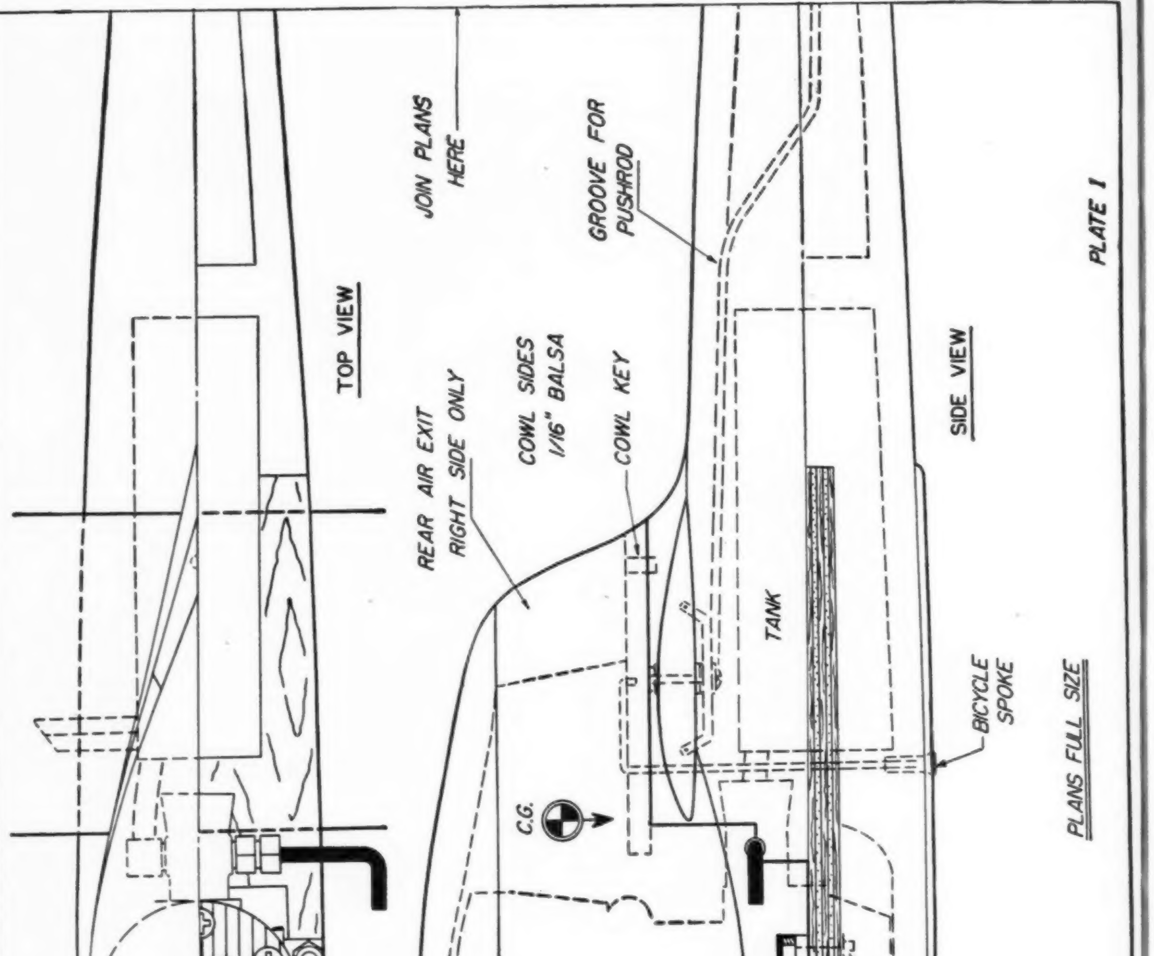
No. 10 Dave Braselton has a lot of fun with his Wee Bipe



No. 11 Unusual R. C. design flown in England by K. J. Miller

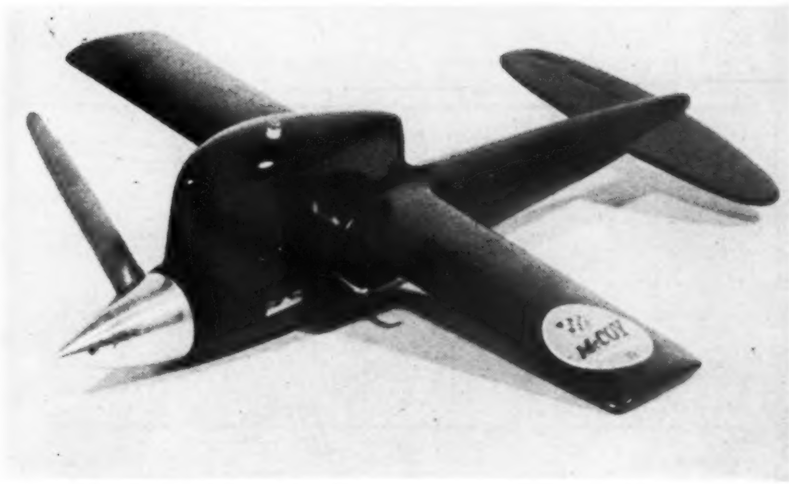


No. 12 Fred Huber's free flight model with entire frame of plywood


TOP VIEW
JOIN PLANS HERE
GROOVE FOR PUSHROD
PLATE I
REAR AIR EXIT RIGHT SIDE ONLY
COWL SIDES 1/16" BALSA
COWL KEY
SIDE VIEW
TANK
BICYCLE SPOKE
C.G.
PLANS FULL SIZE
SKID
1-1/4" DIA. FROOM SPINNER
AIR INTAKE 1-7/16" X 1/4"
Black Bird
by

BLACK

BIRD



by EARL CAYTON

THE *Black Bird* was designed to turn in top speeds, yet be simple to build, stable, and plenty rugged to take the punishment encountered at contests.

As this is written, the ship has yet to be entered in a contest since it was built during the winter in preparation for the 1950 contest season; however, tests indicate that it will give a good account of itself. In calm moist air, using a *McCoy .19*, the *Black Bird* averages well over 110 mph, with 121 mph being tops thus far in tests.

You will notice from the photographs that a novel one-bladed prop is used. I certainly won't debate the added efficiency of this type of prop over the conventional two-bladers, since I use both, but after hearing about the blistering speeds set by Huth, Mathews, and some of the fellows using *Air-o* one-bladers, I am sure that you will at least want to give this little number a try. If your engine consistently stops on compression, as does mine, you can use a one-blader to advantage by installing the prop so that the single blade will always stop pointing up.

Now, if you are one of these "Eager Beavers" with a spare Class A engine laying around just waiting for a good plane to build for it, then chum, dig out that battered tube of glue and let's get busy.

The plans were drawn up full size to save you the job of scaling them up. Merely cut out the correct pages, glue them together, and "presto," we are all set to start.

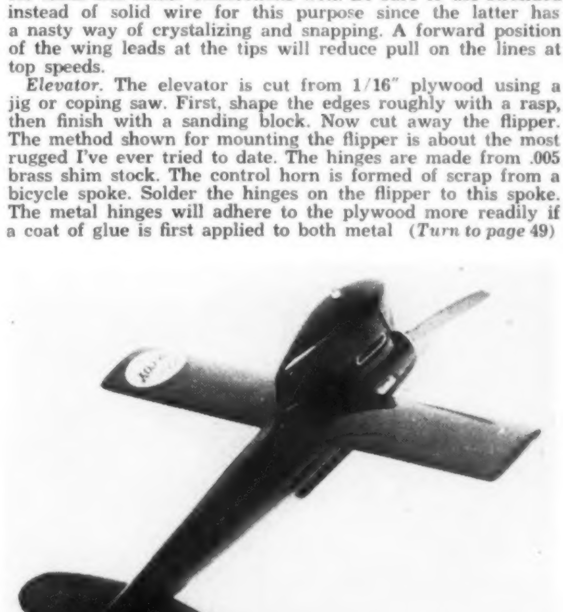
Fuselage. First, select two hard 1-5/8" x 13/16" x 12" balsa blocks for the fuselage halves. Pine is excellent for the bottom half if it is available. Using a coping or jig saw, cut out the motor mounts from 3/16" plywood. I used 5-ply Birch. Next, fit in the engine, mark holes for the mounting bolts and drill accordingly. A small strip of brass shim stock is soldered to the bolts to prevent them from turning when the nuts are cinched down tight. You may now trace the motor mount pattern on the lower fuselage block and carve out a notch to fit.

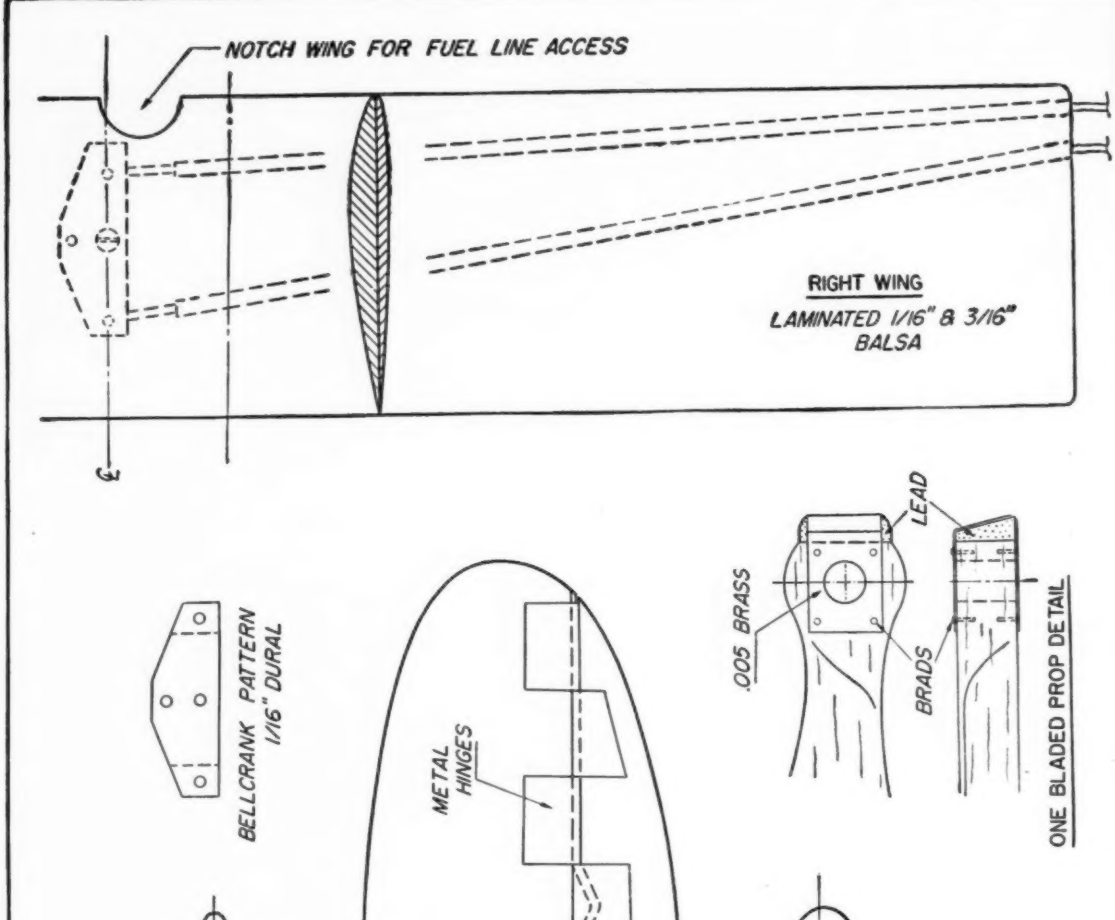
Set the engine in place and line the mounts up. Remember, if the motor has inside thrust, the plane will roll in on the lines after a hand launch; on the other hand, if the engine has outside thrust, the plane will yaw to the outside in flight, thus creating drag and objectionable pull on the lines. The mounts really take a beating, so use plenty of care glueing them into place. First, paint a coat of cement on both mounts and the fuselage block and let dry; then put on a second coat of glue on both mounts and fuselage and join when still wet. Clamp tightly and let dry. After the assembly has dried thoroughly, drill 3/32" holes vertically through both mounts and fuselage, spaced about 1" apart for the entire length of the mounts. Insert hardwood dowels using plenty of cement for adhesive. You now have a set of mounts that will last as long as the airplane. No need to worry about your "hot" speed engine leaving the airplane behind!

The fuselage blocks may now be glued together lightly and carved to shape. Split the halves apart, hollow with a gouge, and cut holes for the engine in the top block. Leave sufficient space around the engine to permit the intake to draw a large supply of air from the cowling. Never cut out a hole in the side of the fuselage for this purpose because dirt will enter during landings. I notice that some fellows do cut holes in the side and cover with a fine screen. This merely sifts out the boulders and allows fine dust to grind out your engine. Do not build the tank until the plane is being assembled.

Wings. The wings are very simple due to the solid construction and rectangular planform. The wing is laminated from two sheets of medium-hard straight-grained balsa 3/16" x 2" x 12" and 1/16" x 2" x 12". After glueing, set a heavy box on the wings and allow to dry thoroughly before carving. Next, shape the airfoil section in roughly with a carving knife and wood rasp. The final shaping is done with a sanding block. After shaping the airfoil to your satisfaction, inlay a small square of 3/64" plywood on each side of the wing at the center for installation of the bellcrank. A commercial bellcrank may be purchased or one may be made from 1/16" dural. The push rod is formed in two sections from bicycle spokes. The knob on the ends of bicycle spokes eliminates the need of soldering on washers which have the bad habit of coming loose from motor vibration. Drill a 3/32" hole through the plywood wing inlays and bolt the bellcrank into place using a #2 bolt. Use washers for bearings. Cut grooves for installation of 3/32" O.D. thin wall brass tubes to house the wing leads. Smooth grooves over with plastic wood or balsa strips. Use 1/20" stranded wire for leads and solder connections well. Be sure to use stranded instead of solid wire for this purpose since the latter has a nasty way of crystalizing and snapping. A forward position of the wing leads at the tips will reduce pull on the lines at top speeds.

Elevator. The elevator is cut from 1/16" plywood using a jig or coping saw. First, shape the edges roughly with a rasp, then finish with a sanding block. Now cut away the flipper. The method shown for mounting the flipper is about the most rugged I've ever tried to date. The hinges are made from .005 brass shim stock. The control horn is formed of scrap from a bicycle spoke. Solder the hinges on the flipper to this spoke. The metal hinges will adhere to the plywood more readily if a coat of glue is first applied to both metal (*Turn to page* 49)





NOTCH WING FOR FUEL LINE ACCESS
RIGHT WING
LAMINATED 1/16" & 3/16" BALSA
BELLCRANK PATTERN 1/16" DURAL
METAL HINGES
BICYCLE SPOKE
STABILIZER 1/16" PLYWOOD
.005 BRASS
LEAD
BRADS
ONE BLADED PROP DETAIL
"BLACK BIRD" Ctd.
TOP VIEW
SIDE VIEW
PLATE 1-A

ENGINE REVIEW

THE NEW FORSTER G-29

by E. K. WATERS

MODEL builders, though few may realize it, today live in a veritable Utopia compared to the early days of gas powered model flying! An almost endless variety of planes is available at small cost, many prefabricated ready to assemble, with engines to power them in many sizes—all of them better, faster, and more powerful than prewar engines. Like all things at the beginning, about fifteen years ago model aircraft engines were undeveloped, unreliable, unpredictable, and relatively slow and weak. They carried a big price tag however—a fairly good one in the late 30's, when model gas engines really came into their own, would set you back something around $20. Since then, most everything has gone sky high, doubled in many cases. Pop earns over twice as much as he did before the war but model engine prices have dropped almost 50%! Engine manufacturers, through the fiercest kind of competition, are knocking themselves out, with the net result that today American-made model engines are the finest in the world, available to everyone at ridiculously low prices. In nothing else which the modeler requires does his dollar buy more value.

The new *Forster G-29* glow engine is an example of the progress made in model aircraft engines, not alone in performance, but in endurance and refinement of design as well. It has a bore of .750", a stroke of .672", a displacement of .297 cu. in. and weighs 6-1/2 ounces.

Let's take a look inside; remove the crankcase cover, fastened with three machine screws. Off with it comes the crankshaft, which is freed by first removing the crankshaft retaining ring. This part serves the dual purpose of limiting end play of the crankshaft and avoiding the transmission of pressure onto the rotary disc valve when cranking the engine with an electric starter. (Many a good engine has been damaged by such starting, and this retainer ring does away with the danger entirely.) The crankshaft is sturdy, 3/8" in diameter, hardened and ground to a fine finish, and rotates on a 7/8 diameter precision ball bearing. The ball bearing, located next to the crank cheek, takes the major radial load and all of the thrust load, while an oil-lite sleeve bearing at the outer end of the shaft seals the crankcase compression. The propeller hub seats on a long taper which insures good alignment, makes a positive friction drive and is long enough to be considered an extension shaft. It brings the rear face of the propeller 1-1/4" forward of the cylinder, making an ideal setup when cowling the engine in. The propeller nut has a 1/4" hole threaded entirely through so that a spinner can be added.

The cylinder is made from a solid bar of alloy steel and heat treated for better wear which, gives it a contrasting blue-black color. There are five large square exhaust ports and four square intake ports. The bore of the cylinder has a very smooth "super finished" surface. The cylinder is fastened to the aluminum alloy crankcase with four machine screws. It can easily be removed, for it is a perfect slide-fit, an example of good machining. The cylinder head comes off after removing six screws.

Deep, evenly spaced fins provide good cooling for the cylinder and cylinder head. No gasket is used between the cylinder and crankcase, but between the cylinder head and cylinder, a special heat resistant thin gasket is used which is locked in a recess of the cylinder head casting to prevent the blowing of the gasket. This is indeed an excellent idea! The cylinder head is made of aluminum alloy with a spherical combustion chamber which fits the outline of the piston very closely, resulting in a high compression ratio of 10 to 1. Combustion chamber design bothered the designers of both 4- and 2-cycle engines considerably in the early history of the internal combustion engine, but fortunately, through the research work of such men as Ricardo, the problems have been solved. In the early automotive days, a compression ratio around 4 to 1 was necessarily tops, limited by violent detonation; through better design and better fuel the ratio was gradually increased to the present high values. Piston material and design influence the maximum possible compression ratio greatly. There must be no hot spots and the heat of combustion must be carried away quickly. On the *G-29* engine, the piston is made of aluminum alloy and carries two cast iron piston rings. The baffle on the piston head which serves to deflect the incoming gasses upwards, is high and well formed. The piston pin of hardened tubular steel, ground to 1/4" in diameter, is full floating and two tiny retainer rings are used to keep it in position, to prevent scoring the cylinder wall.

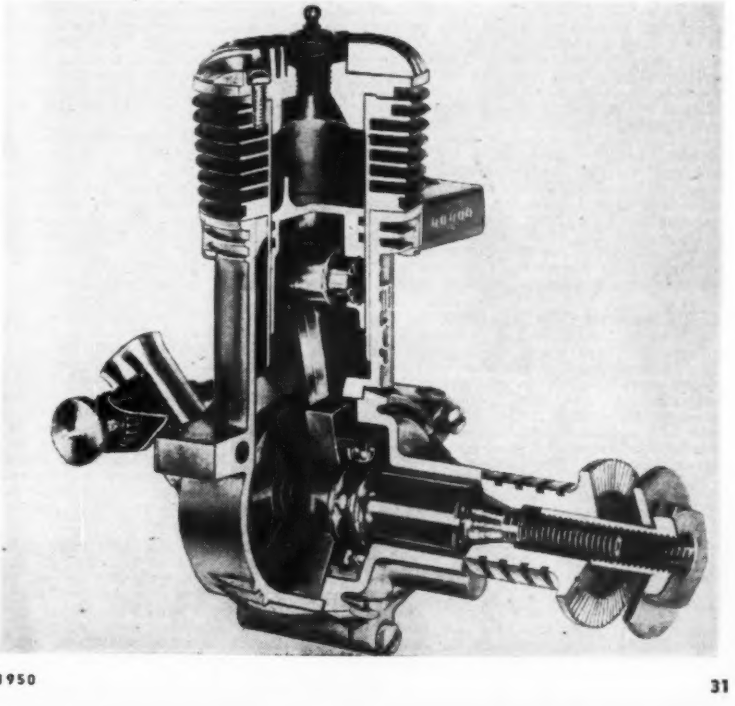
The connecting rod is sturdy and made of cast aluminum alloy with an *Oil-ite* bearing at the crankpin end which is 1/4" in diameter and 3/16" wide. The disc rotary valve has a square port opening, is made of steel hardened and ground, and rotates on a hardened steel pin. It is driven by the crankpin. When the crankshaft and connecting rod are in place, there is very little space left, which results in a high crankcase compression ratio, very desirable for high speed operation.

At the rear of the crankcase, at an approximate angle of 45°, the down draft air intake tube is secured by means of a lock nut, allowing the needle valve to be turned and locked in any one of several positions. A small hole in the air intake tube helps prevent flooding of the engine during choking. At the lower or inside end of the air intake tube in the crankcase casting, the passage widens into an accumulation chamber, which through its ability to momentarily store up fuel, adds to volumetric efficiency. The needle valve is made of steel and has a long tapered point, while the adjustment threads are very fine, allowing a wide range. A dependable double rachet spring is provided which positively holds the needle valve setting. This is a small but important detail and may mean the difference between a good flight and a complete wreck. The needle valve, however, seems rather short for some installations and one with an extension would be more desirable for easy accessibility. It is understood that such a longer needle valve will be available soon, while a short propeller drive washer is available now.

Starting of the engine was found to be comparatively easy. Due to the high-head compression ratio, there is a tendency to kick when using small diameter light propellers. This tendency diminished as the engine was broken in a little. The engine runs remarkably smooth, a very desirable feature, and to insure this smoothness, you should make certain that your propeller and spinner, if you use one, are in good balance. An unbalanced condition produces vibrations, and vibrations absorb power which must necessarily be given up by the engine. The more power wasted in vibrations, the less you will have at the end of the crankshaft.

For top results, good fuel is very important. Because the engine is capable of operating at extreme high speeds, make sure that the fuel you use contains at least 25% castor oil to prevent excessive wear and overheating. Fuel consumption, in general, is based on the displacement of an engine, and the speed at which the engine operates; the higher the rpm, the greater the power output, and the more fuel it will consume.

The engine tested had noticeably good compression which increased as the engine was being broken in. This is normal with piston-ring engines, and the performance may be expected to improve with more running. Altogether, the *Forster G-29* engine is a fine example of modern design and first-class workmanship to very close tolerances, and is a power plant that any modeler will be *proud* to own.



HOBBY COUNTER

Conducted by THE TRADE OBSERVER

AL GREENSPAN, of Campus Industries, Inc., (1100 Adams Ave., Philadelphia 24, Pa.) was telling us about the many revolutionary ideas involved in their new 29, a glow plug engine designed by Bill Brown to sell at $7.95.

About five years after my shop was opened, young Bill Brown and Maxwell Bassett (the airplane end) wrecked the Nationals, held that year at Roosevelt Field, Long Island, with the gas-powered model. Until the *Ohlsson 23* came along, the *Brown Jr.* was the engine you had to buy. Then, after the war, Bill designed those small *Campus CO2* engines which, in the experience of some of my customers, make for beautiful sport flying, especially if you like little scale models. What's special about the *Campus 29?* A rotary-glow job, it has two by-passes, one in front and one in back of the cylinder, giving an opposed flow pattern to the fuel mixture for better scavenging action and more ideal diffusion of volatile fuels. There's also an "auxiliary air intake" which opens the crankcase to atmospheric pressure upon completion of the carburetion cycle. This increases carburetion efficiency, insures a full fuel charge going into the cylinder, permits a smaller rotary valve passage in the shaft and, hence, a stronger shaft. The valve is used to greater advantage in controlling fuel flow, since its primary function is not to take in air.

* * *

Speaking of engines, a couple of our boys are mighty pleased with the latest K & B, which is an .049. K & B Mfg. Co. (224 East Palmer St., Compton, Calif.) puts up the .049 in a very attractive package, including a 6 x 3 prop, the new *K & B Slip-On Connector*, fuel tank, fuel line, and two service wrenches. All this for $5.95.

Things we like about this engine are its easy starting, the new standard 1/4-32 thread K & B plug, easy mounting (standard with the two smaller K & B's by the way), and the *Slip-On Connector*. This little gadget simplifies things 100%. Alligator clips are always a nuisance, especially on small engines where they wreck glow plugs, short out, and slip off at the drop of a hat—to say nothing of causing you to stop the prop with your knuckles. This new glow plug connector is a beaut. Slips *off* too!

* * *

Carl Goldberg's *Cumulus* ($4.95, by Top Flite Models, Inc., 2635-45 S. Wabash Ave., Chicago, Ill.) was worth waiting for. It's a highly prefabricated kit with numerous die-cut parts and makes up into a sleek, high climbing, good-gliding model. Designed for .19's to .36's, it has 3 sq. ft. of area, spans 54", weighs 16 oz., less engine. Features include drop-out engine compartment, high-performance wing section (and that's no malarkey!), positive keying, streamlined design with sheeted fuselage, and simple dethermalizer. Since Carl has embodied features proved over the past decade, it is more than likely that the *Cumulus* is the greatest Goldberg free flight job to date. Drop in and I'll be glad to show you the kit!

* * *

Have you used *Trim-Film* yet? If you have hesitated to try this new idea, wait no longer. It's one of the greatest things since the apple hit Newton on the head! Put out by Hobby Decal Specialists (393 Smith St., Perth Amboy, N.J.) it comes in booklet form (25c) with three sheets of different colors. There are several different booklets giving a choice of a number of colors.

You can really dress up your ships with Hobby Decals new Checkerboard, 72 sq. in. for two-bits. Color-size combinations are red-black-white in 1/4" and 1/2" squares. Because of its transparent background,—just think of the holes in doughnuts and you'll get the idea,—you can have any choice of color. The natural color of the covering, or the color-doped covering, shows through the transparent "holes."

Another Hobby Decal item in our shop is a handy large-size book which contains the popular letters, like NR, NC, AMA, and the numerals, all in several sizes and colors. You can buy the letters and numbers *you need;* we just pull out the required ones along the perforated lines. Use them ourselves, too. Soak in water *not more* than 10 secs. and they slide right off onto your plane. Lots of my customers support the AMA by affixing their AMA license number on the right topside wing panel.

* * *

Well, there's more news from that man Walker. This time Jim has a clever gadget called the *Speed Retarder* which should spur U-control flying to even greater popularity. What is the *Speed Retarder?* How does it work?

It's a simple device, made of metal, fastened behind the propeller. It looks as if two short blades were added to the prop to make it a four-blader. The pitch of its blades is set opposite to that of the prop and these blades may be twisted for adjustment to any speed so that anyone can learn to fly "gradually" without painful crack-ups.

One of the great disadvantages of glow ignition is the inability to throttle back, as can be done with spark. According to no less an authority than Jim himself, almost every beginner cracks up trying to learn to fly on glow. The *Speed Retarder* virtually ends that, since it decreases thrust depending on how much "reverse pitch" you set into its blades. Seems like it will also be a boom to the free flight boys who are afraid to use glow due to testing difficulties.

American Junior Aircraft Co. (1166 N.E. 31st Ave., Portland 12, Oregon) is including the *Retarder*, along with full instructions, in the *Firebaby* kit. Did we say kit? All you do is start its engine!

Walker's *Sonic Control* system took a big step nearer final perfection with the development of a new "ear," which is in the form of a cylinder 3-1/2 or 4" in diameter, and 12-18" long. Jim says a tremendous increase in range has resulted without erratic operation from unwanted noises.

* * *

It is a crying shame how many fellows come into my shop because of engine troubles. It won't run, or it won't keep running. Every dealer has a constant public relations problem on his hands as the go-between of customer and manufacturer. Why doesn't someone get up a complete

"facts" pamphlet to go with their engine—but we should talk. Did some of these things ourselves once! Take tubing. Apparently, most people don't notice the diameter of the tubing on their small engines and they replace it with larger inside diameter tubing. This vastly increases the weight of the column of fuel to be lifted into the crankcase from the tank, especially in jobs with the tank beneath the motor. Use small diameter tubing. Then there's the chap who runs tubing around sharp corners. It buckles and there ends his fuel feed! For sharp bends use thick wall tubing. There are many makes of tubing on the market but this time we're reporting on some samples of Sterl-X, by Sterling Models (406 Vine Street, Philadelphia 6, Pa.).

Sterl-X comes in two sizes: regular (3/32 I.D.; 3/16 O.D.) at 15c the foot and Small (1/16 I.D.; 1/8 O.D.) at 12c a foot. According to Sterling's Ed Manulkin it is a non-collapsing wall tubing which can be tied in knots without shutting off fuel.

* * *

If you haven't seen your dealer for a week or two, get him to show you the *Berkeley* (Berkeley Model Supplies, 138 Greenpoint Ave., Brooklyn, N.Y.) *"A-B" Speed Controliner*, a really extraordinary kit ($3.95, and cheap at that price) of Don Newberger's championship speed job for engines of .19 to .36 displacement. It features metal wings and engine cowl, plus carved hardwood fuselage. When Bill Effinger, that is— Mr. "Berkeley," showed us this speed kit he said you would be seeing ads on July 10.

Conforming to new AMA rules, Berkeley also has new controline wire as follows: .008, .010, .012, in 55', 70', and 150' coils, at 50c, 65c, and $1 respectively. The .014 and .016 lines come in 70' and 150' coils at 65c and $1 respectively.

If you are having ½A timer troubles I suggest you try Berkeley's fuel meter for 50c. This compact meter is installed between engine and tank. Enough fuel line is used to run the engine for the length of time desired. When ready to launch, you set the handy arm which permits only the fuel in the line to reach the motor. The gadget is both small and light.

* * *

It's good news to model bugs when a manufacturer offers a pre-fab flying beauty for 25c. That's what the newly formed Airlane Model Co. (318 W. 29th St., Chicago, Ill.) is doing. The Beechcraft *Bonanza*, first of a series of six models, has a 13" wingspan; 15" wingspan models, all of which also sell for 25c, include the Stinson *Voyager*, *Taylorcraft*, Piper Cub, *Aeronca* and *Cessna 170*.

* * *

Random Notes: Still haven't seen (as this is written) one of Atwood's *Wasps* but grapevine has it that it is a remarkably compact job, even less in height than the .02 *Infant*. Has general lines of *Dooling .29*, but a front rotor and mounts radially by two screws, a la the K & B's . . . Comet Model Hobbycraft, Inc., (129 W. 29th St., Chicago, Ill.) has just announced their ten-cent line of E-Z to build *Struct-O-Speed* prefabs, including the Piper *Cub*, *Taylorcraft*, Aeronca, Stinson *Voyager*, Cessna, Fokker D-VIII Six more models to be added to the series later. Coming out this month are the Comet $1 *Structo-O-Speed* prefabs with plastic molded parts. For small motors up to .045, these items are the *Taylorcraft*, *Cub*, and Aeronca, if you want to build the entire series, Comet will add three more models later. For engines up to .074, there's a Piper *Cub Trainer* at $1.95 . . . There's an amazing engine parts catalogue published by National Model Distributors (2516 N. Greenview Ave., Chicago, Ill.) It covers all parts and their costs for the following engines: *Arden*, *Atwood*, *Baby Spit*, *Campus*, *Dooling*, *Dyna-Jet*, *Forster*, *Fox*, *Madewell*, *McCoy*, *O & R*, *OK*, *Rocket*, *Super Cyke*, *Thimble Drome*, *Torpedo*, *Vivell*, *De Long*, and *Hornet*. One of the best reference works we have seen. You need one!

Scrap Box

(*Continued from page 2*)

recently and encountered an old character, well equipped with *Sailplanes*, etc., who proudly (and sadly) said that free flights broke up his home. Temporarily, 'tis hoped. Went into another quiet store to get a soda and suddenly a glow engine blasted away in the cellar underneath! But this is nothing compared with the railroad hobbyists. Heard of one who hired himself a swanky five-room apartment, hardwood floors and all, in a fashionable neighborhood. Did he decorate it? Did he put in nice new furniture? No sir! He put his *Lionel* railroad in there, all five rooms full. Cut tunnels through partitions, hung platforms on all the walls. When the landlord found out he ran about like the French cook who found *Powermist* in the soup kettle. So our boy moved to the country and devoted all of the upper floor to the cause. More tunnels. High trestles over stair wells. When he played the controls he looked like Jessie Crawford at the mammoth organ.

"I would like to get into the four-minute Wakefield act," says Don Donahue, the old rubber man from La Crescenta (California—where else?). "I believe one can be designed to do 4 mins. in poor air, but haven't seen one yet. Chesterton's *Jaguar*, John Kiener's '49 model, Lo Sailsbury's '49 and '50 models are the best I have seen. Kiener has a 90-second motor run, good climb, etc., but it let him down in major contests. Salisbury has a 35-to-40-second run—60 on the 1950 ship—and always placed high. I have been flying a 1948 model in all rubber meets with good results. It has made more 5- and 10-minute flights than any model in this area.

"Only thing wrong is pilot error. Too early a first flight. Forget the dethermalizer. It's a small model, 34" length, 5" x 41" wing, single rudder, but a total weight of 8 oz. Props were 33" to 40" in pitch (aha, an honest man!) on 28 strands of T-56 3/16" rubber, 33 to 48" long. *Elmic* timer to pop up tail to 80°. Never did less than 2:07 in poor air, had one 3:58 flight and one 3:00 minute flight in cold, heavy fog. One foggy morning the *Thermal Thumbers* had a contest and the best times were 2:15 to 2:45. P.S.: Try 1/4 to 1/2 oz. clay in nose on windy days, say from 12 to 30 mph." Not bad that last suggestion; any expert knows the headache of having to make windy weather adjustments. By the looks of things at the Mirror Meet, the younger generation of free flighters doesn't know that a ship, adjusted properly for calm or mild breeze, will stall all over the lot in a sturdy wind. Reminds us of the big *Civy Boy* that exploded in front of the R.C. event. The wing broke in half, the ship shed the wing at the same time, and the dethermalizer popped up the tail. Just like the day-time fireworks!

Don Donahue *disagrees heartily* with our statement some months ago that the AMA should not dig into its pocket to get a Wakefield team across, when no sponsor is available. Have the models proxy flown was the suggestion (Gordon Light's model was proxy flown when he won the trophy). Don argues why should we pay $32,000 into the AMA if they can't use $5,000 for a good cause. We'll stick to our guns, Don. Much of that $32,000 probably didn't come from "us." Further, finances always are so marginal that in years of relative feast we should provide against the possibility of famine. We have insufficient reserve at all times. Okay men, pick sides.

"In the June issue of MODEL AIRPLANE NEWS you published part of a letter from June Dyer, calling for a definite outlawing of the use of the fuse dethermalizer," says Hal Makinson of San Rafael, Calif. "We of the *Marin Air Pirates* would like to suggest a much less drastic alternative which has been tried with fuse dethermalizers and found to work satisfactorily.

"All that is required for this safer operation is a piece of 1/8" I.D. (inside diameter) copper tubing and a small piece of light asbestos sheeting. Cement the sheeting to the fuselage and the tubing to the sheet. In use, the fuse is threaded through the tail hold-down bands and then pushed into the tubing. In practically every instance we have

found that the fuse will go out due to the heat dissipation of the copper tubing. In the few cases where the fuse has not gone out, we have found the ash indicating that the fuse had burned safely instead of falling free with the attendant fire hazard. To re-use, simply push the stub of the old fuse clear with a piece of wire.

"The *Marin Air Pirates* hope this suggestion may help avoid placing a ban on restrictions on the use of an efficient, lightweight, and foolproof dethermalizer."

It's the time of the year when any stranger who approaches probably is a member of some AMA committee, such as free flight, radio control, and so on. At the Mirror Meet who should show up but "dark glasses" Val Luce, the man who can talk like Colonel Stoopnagle. "What do you think of free flight?" he asks by way of renewing an old acqaintance. "Too prejudiced," was our reply. Cal Smith, the ukie scale man who really makes the things fly ("Please stop," said the judges at the Mirror Meet, unable to stand it any longer), standing near by, piped up, "Throw out anything over a .19!"

"Lots of guys want to increase the wing loading," Val goes on ignoring the recalcitrants (picked up that word for $4.98), "but that means still bigger wings."

"Yeah, but did you ever see an *Infant* in a big *'Scivvy' Boy*," said another chap, eager to help. Anyway, later, much later, when we could stop thinking about McElwee's job torpedoing the wind, we decided to buy Smith's suggestion. In fact, as far as we are concerned, they could throw out anything over an .09. Just then a guy walked up with a ½A *Phoenix*, an .049 job. Frank Ehling had him in tow. "Fourteen minutes, first place, one flight," says Ehling. The rules discussion stopped right there! Leon Shulman, rumored seen with a free flight model again, said, "One flight? In this wind? Wish I had seen it!" "During a lull, we did it," said the modeler. Did he? Didn't he? These gags.

To start a modest riot, stand in a crowd with a trainer ukie ship in your hand. It mystifies everyone. "You fly that thing?" someone asks. This is in the crowd mind you, not out on the flying field. A middle-aged woman with tired feet asks if it is a Testors job. "I sell them," she tells us. "Made two and fell in the mud flying them." Gad! Some squirt comes up with several admirers in tow and makes a lot of remarks about it being underpowered, heavy, what would happen in the wind. Now this ship we carried was a built-up job with a *McCoy .09*, somewhat smaller than a *Papoose*. Lots of boys have flown it and dished out criticism and suggestions, all applied. Kids would grab the leads and wiggle the flippers. Ex-modelers would take it out of our hand, turn it over, hand it back without a word. With nothing but stunt and speed being flown at the time, that trainer plus a serious face, sure had them puzzled.

Now, friends, it is your turn. Puzzlement shall be yours in large quart sizes. Give an ear to Morgan Baldridge—wait a minute! There's a robin outside the window picking up straw. Not one piece, but a whole beak full. Will he get off? This is a real pay-load event. There he goes . . . Now, Morgan, where were we? Oh yes—Morgan is a hobby dealer, his shop located at 327 So. Washington St., Peoria, Illinois, the town where our fathers used to sing they wanted to be. Ready timer?

"Bob Draper and Bill Mitchener were engaged in combat, flying *identical* planes. Bob looped his job under and up in front of Bill's, and right around his lines. Both planes flew one lap with lines twisted. This, incidentally, was Bob's first combat flight and he was an inexperienced pilot at the time. Both planes went into a half loop and Bill was flying inverted, even if he didn't know how. Bob did a half loop from inverted position, getting upright, and disengaging the lines, only to meet Bill on the opposite side of the circle, still inverted. Bob dove underneath, and Bill looped to bring his ship upright.

"Bob decided this was fun, so he dove on Bill and zoomed, just missing Bill's tail, and Bill headed for the ground, zoomed up behind Bob, over Bob's plane and dove in front, once again tangling the lines. Bob

started shifting the handle from one hand to the other trying to get things straightened out, finally made it, and zoomed into the clear. But poor Bill, now befuddled, thinking it was his plane zooming, gave it down elevator." We will now observe a minute of silence.

As we take leave of the beautiful land of aeromodeling . . . Morgan, we'll have to leave it to you whether the free subscription to M.A.N. for the best tall but true story of the month, is to go to Bill and Bob. It's going to you for the telling, and you can scissor the copies in twain.

P.S. notes . . . Joe Dale, Bill Effinger's old-timer sidekick, has 75 British Diesels. Showed us the famous British *Yulon* stunt engine at the Mirror fracas and said that the *Mills* diesel (about an .045), turned an 8-4 prop at 9,000 rpm when he tested it. Dick Struhl made the supreme sacrifice for modeling; he became an optometrist in Rockville Center, Long Island. Maybe there's still hope for near-sighted modelers. Okay, okay, we're going!

North American Trainer

(Continued from page 21)

from the T-6 without a hitch and many jet fighter pilots are now on active duty who received *all* their flight training in the AT-6!

This experience decided the Air Force: for future planning there would be only a "training" plane to cover all the many steps in the training of a student. With funds again available, the Air Force issued a circular bid proposal for the design of an entirely new kind of training plane, one with the low-speed stability and maneuverability of the biplane primary trainer and the high-speed performance of the advanced trainer. Twelve aircraft manufacturers submitted designs and the Air Materiel Command at Wright-Patterson Air Force Base, Dayton, Ohio, spent weeks pouring through the drawings and detailed specifications before announcing that the winning design was that of North American Aviation, Inc. In May, 1948, the familiar "PT," "BT," and "AT" designations were stricken from the records (after use since 1924!) and the first of the new-style training planes was designated the North American T-28, our Plane of the Month.

What kind of airplane is the Air Force getting for all this money? The answer is an excellent one, and one that is everything an airplane bringing a revolution to training should be. Mr. Dave Hoffman, project engineer on the XSN2J-1, learned that an airplane of that size and power was just too big for the day-in, day-out training of pilots. His first step, in shaving down the big XSN2J, was the selection of a power plant and all his figures kept coming out around 7-800 hp. That was just beyond reach of the tried-and-proved Pratt & Whitney R-1340 *Wasp* engine (600 hp) and too little to make the big Wright R-1820 *Cyclone* worth while. To solve this problem, he went back to the Wright R-1300 seven-cylinder radial engine, developed back in 1937 but abandoned during the war due to the constant demand for high-horsepower engines for the armed forces. After the wartime pressure had eased up a little, Wright engineers dusted off the R-1300 and produced a version that developed 800 hp for take-off and a 700 hp maximum continuous rating.

Having disposed of the power problem, Dave Hoffman and his crew of designers next set about the problem of making their new training plane "hot" enough to prepare students for jet fighters, yet stable enough to permit safety in slow-flight maneuvers. A tricycle landing gear was essential—but putting such a gear on a single-engine tractor monoplane is no simple design problem. The nose gear trunnion must be located as far forward as possible and yet leave room for the engine! North American engineers accomplished this feat, however, for the first time in modern training plane history.

The engine is located in the extreme forward portion of the cowling, the lower engine mounts also supporting the nose gear fittings. The new-style engine cowl is "solid" with the fuselage, instead of a separate cowl with an air gap all around its perimeter, as in prewar types. Engine cooling air exits out of only two large, controllable outlets on the upper aft portion of the power plant compartment, one on either side. The exhaust is collected and is also directed to the outside air through two flush troughs. The oil cooler is mounted entirely within the lower left side of the power plant compartment and the amount of cooling is controlled by an adjustable air outlet. The entire motor mount is canted downward 3° (yes, 3° downthrust, you model builders!) to minimize the effects of power on stability.

An NACA low-drag 15% 65-series airfoil is used which gives maximum lift coefficients well above 2.0 and thus enables very quick take-offs and slow landings. The T-28A actually stalls at only 72 mph, which is very low for a high-performance military aircraft with a wing loading of 23.8 lbs./sq. ft. Slotted flaps are used and the ailerons have controllable trim tabs on both panels. The ailerons are statically and dynamically balanced and are fitted with static discharge braids along their trailing edge.

The landing gear has an exceptionally long travel to give the benefit of the doubt to the hard landings of students. The main gear folds directly inboard and is completely sealed by large fairing doors in the retracted position. The nose gear folds directly rearward and fuselage doors close the opening. These fuselage doors offer a convenient access to a mechanic when the plane is being warmed up on the ground since his whole upper body can pass through these doors and into the engine compartment for minor adjustments without the necessity for removing any cowl sections. A unique feature of the T-28A nose wheel is the fact that it can be steered by either student or instructor through a combination electrical and hydraulic boost control, which simplifies ground taxiing and maneuver problems. Each of the three wheels and tires on the T-28A are identical: 24 x 7.7, and use Goodyear single disc 3-spot brakes. The tread is 12' 7.89". The landing gear shock struts are air-oil designs by United Aircraft Products.

Vision is of primary importance in a training plane and the T-28A offers more vision than is found in any other military airplane. Large bubble canopy is divided into two segments, the large rear portion moving to the rear and the students canopy moves slightly aft for access to the cockpit. While the Air Force requires only 11° visibility over the nose, the T-28A actually has 12-1/2° visibility downward and forward.

The T-28A has a span of 40' 1", is 32' long, and stands 12' 8" high, making it roughly *Mustang*-size. It weighs 5,111 lbs. empty and 6,365 lbs. loaded to its normal weight. Its gross weight can go up to 6,759 lbs., however, when the full fuel capacity of 125 gallons plus extra equipment is desired. It uses an Aero Products two-blade constant speed propeller 10' 5" in diameter.

The Wright R-1300-1 engine develops 800 hp for take-off and has a normal rating of 700 hp at 2,400 rpm at 5,000'. This power gives the T-28A a top speed of 288 mph—which is really moving for a training plane! It normally cruises at 190 mph. It gets off the ground in only 722' and can clear a 50' obstacle from a standing start in only 1,310'. It climbs from sea level at a rate of 2,570 feet per minute and has a ceiling of 29,800'.

The first T-28A made its initial test flight September 26, 1949, with Jean "Skip" Ziegler at the controls. It went directly to Edwards Air Force Base, Muroc, Calif., where it completed its official USAF "Phase One" tests in February, 1950, a week ahead of schedule (most planes run months behind schedule in these tests). Meanwhile, the Inglewood production line began to roll. T-28A's Nos. 2 and 3 are going to Edwards. No. 4 is scheduled for the all-weather tests at Eglin Air Force Base, Fla., and the next 114 airplanes are tabbed for Williams Air Force Base, Ariz., home of the jet training school, where the T-28A will deliver its once-fledgling pilots directly into jet fighters ready for action!

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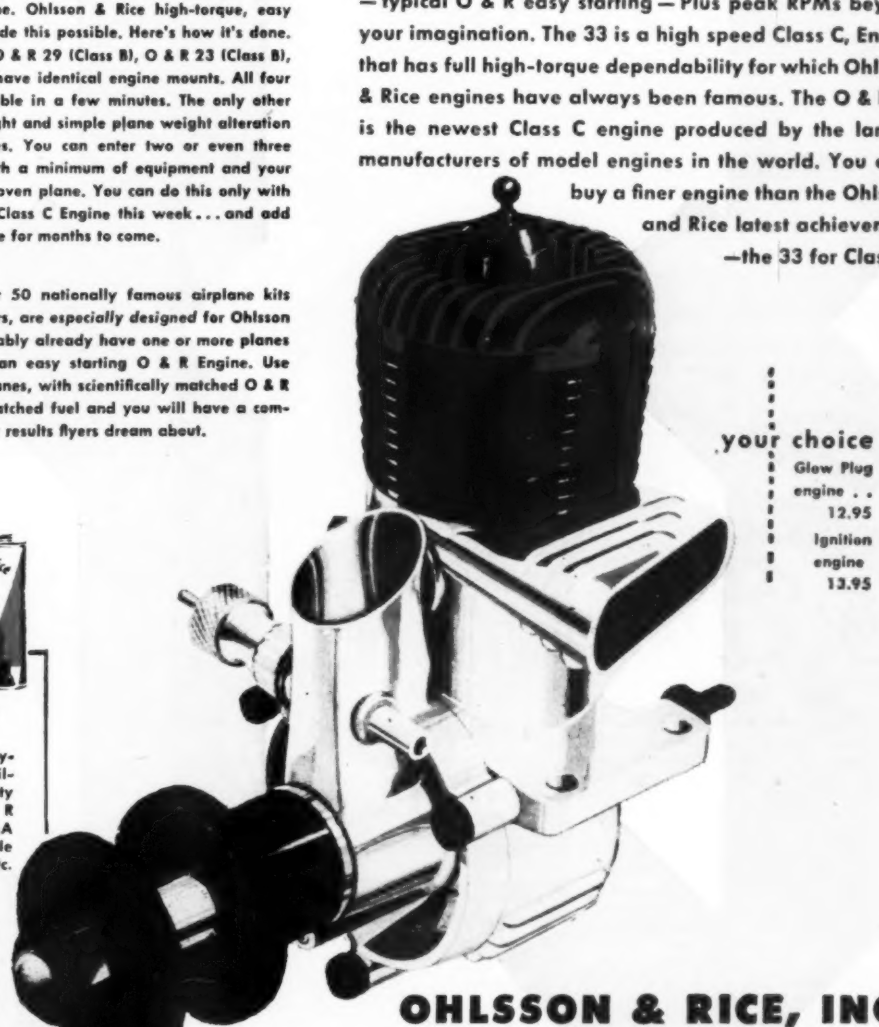

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Standard of the Model World

Foote Racer

(*Continued from page* 11)

released, the wire hinges upwards at the rear allowing the rubber bands to fly off the wire and come to rest around the rudder, causing the stabilizer to pop-up at the rear. A string is used as a stop to limit the angle of pop-up; 40° is recommended as a starter. Too fast a rate of descent will result from too large an angle of pop-up, while a spin will result from too small an angle.

The rudder is next built flat on the plans, and after thorough drying, is removed so that the stabilizer can be built.

In building the stabilizer, note that the ribs are cut from 1/32" sheet. Be sure that the spar is raised from the board slightly so that it is flush with the bottom of the ribs. The 1/32" sheet over the front of the stabilizer does not come clear to the tips so that the tips can be rounded off after the stabilizer is removed from the board. The rudder is cemented into place, the front of the stabilizer and the center section are sheeted, and to guard against warps, the cap strips are put on the ribs before the stabilizer is removed from the board.

After the cement is dry and the stabilizer has been removed from the board, the lower part of the center section is sheeted. The front and ribs are not sheeted on the under side. Trim, sand, and cover with paper. Finish with four coats of dope.

The two 1/32" wire skids are cemented into place after the stabilizer is completely finished. These weak skids are far more practical than sub-rudders, for they will bend when hit from the side, whereas a sub-rudder will break or pull out.

From the center of the wing to the outer dihedral joint, the leading edge is made from one piece of balsa. Beyond this, it is laminated from two pieces. A single piece can be used here also, but it is not recommended because it puts a strain on the wing which might cause warps. The first piece of the laminated leading edge is cemented to the ribs. The second piece is not cemented to the first until the cement holding the first piece is dry; then it is cemented to the first piece and held in place with spring-type clothes pins.

All dihedral joints should be put in at once. Pin the center section to the board; then block up each outer dihedral joint and the tips the proper amount. Therefore, a jig is formed which is necessary to control warps and should be used when doping the wing, as explained below under flying instructions. Waxed paper can be used under each joint to prevent the wing from sticking.

The cowling should be made from thin aluminum sheet, although the metal from an old tin can will do.

The PAA-Load event rules for 1950 specify that the pilot must face the front of the plane. This amounts to requiring a minimum cross section for the ship in addition to requiring the ship to lift a load. It is a tremendous advantage in streamlining to use a minimum cross section. In ordinary AMA contests, no minimum cross section is required. Therefore, if the flier does not intend to enter his *Racer* in a PAA-Load event, it is recommended that a narrow fuselage as shown on the plans be used.

If the ship is to be used for the PAA-Load event, the fuselage must be widened out so as to provide enough space for the pilot. This is done simply by building the crutch wide enough so that it will accommodate a three-inch wide pilot. The crutch should be tapered as rapidly as possible behind the point where the pilot is to be placed.

The wing platform must also be widened out to accommodate the three-inch pilot. In this case, the rear of the platform is left square instead of being cut to a streamlined shape.

The front section of the keel is built just as on the plans from the point of cross section C forward. From cross section C to the rear, two identical keels are built, one on top of the other.

The front portion of the keel is cemented to the center line of the crutch as before and the wing platform is built up. Then, the two keels from cross section C rearward are cemented along the outer edge of each

(*Turn to page* 40)

crutch spar to form the sides of a rectangular fuselage. Cross members are inserted across the top of these two sides; the top of the fuselage is planked as well as the sides.

Uprights within the cabin are used to keep the pilot in place. These are shown on the plans as dotted lines just behind the upright at cross section B. When a Class B motor is used, two pilots are used. The plans show the two pilots in place. If a Class A motor is used, only one pilot is necessary. In such a case, the upright is placed farther back so the pilot fits snugly in the body. The pilot, or pilots, should be placed so that they come directly under the center of gravity so as not to change it when they are in place.

The belly blister is also necessary when using the PAA-Load pilots. If the ship is built so that it can house a pilot, it can also be used in regular AMA contests by simply removing the pilot and replacing the belly blister with a flat door. The drag from the greater cross sectional area will reduce the performance somewhat, but it will save the contestant the job of building two ships.

The PAA-Load rules for 1950 also require that the pilot have a view both to the sides and to the front. It is therefore necessary to cut a window on each side of at least one-inch square and to provide an adequate opening in the front for a windshield. These can be covered with thick cellophane without reducing the strength of the cabin.

I have found the following method of adjustment allows for the greatest error on the part of the flier, and I recommend its use on the *Racer*.

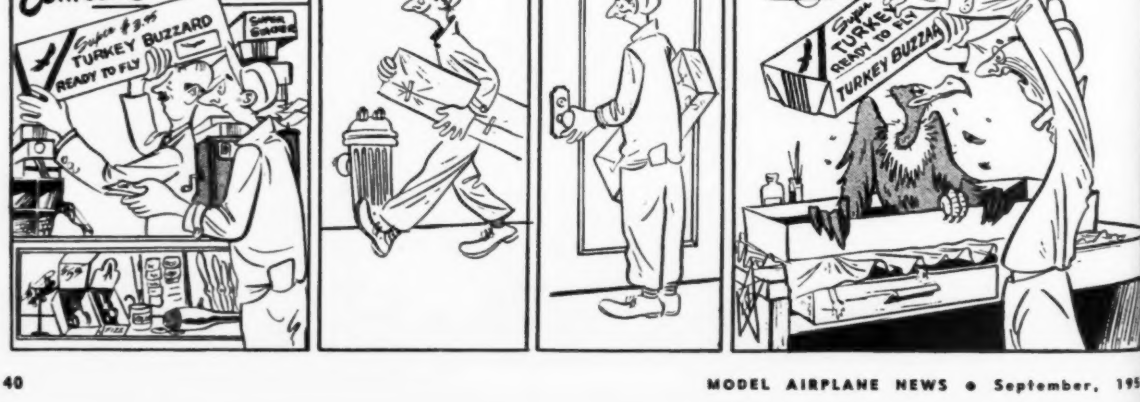
First, be sure that the ship balances perfectly level when held at the balance point. Suspend it from a string to be sure. Then, add pieces of 1/16" sheet under the leading edge or the trailing edge of the wing until the longest, flattest glide is obtained. You will probably have to add weight to the nose to make it balance correctly, and more than likely you will have to add blocks to the rear of the wing to obtain the best glide. The wing and stabilizer should be keyed in position to insure that the ship will fly the same way on each flight. Small pieces of 3/16" square cemented to these members at their four corners is the simplest way to key them in place.

The following adjustments are for a left turn in the climb. If a right turn is desired, *all the adjustments must be reversed*. If only one or two are changed, without changing all the others, there is danger of a crack-up.

When doping the wing, pin it into the jig used for putting in the dihedral. Eliminate the outer blocks and use only the blocks under the dihedral joints. Place an additional 3/16" block under the leading edge of the left wing at the outer dihedral joint. The center dihedral joint and the outer dihedral joint of the right wing must remain flat. This gives the left panel a slight warp and it will have 3/16" more incidence at the dihedral joint. The drag caused by the warp in the left wing will cause the ship to turn to the left in the glide. The greater the warp, the tighter will be the turn. A smaller warp will result in a larger circle in the glide. Be very careful to pin the wing down securely after each coat of dope and allow it to remain in the jig over night after the last coat of dope. This is the only adjustment for putting in turn in the glide. The stabilizer should be absolutely flat, although a warp one way or the other can be overcome by warps in the wing if it is not too great.

Partially counteracting this turn should be a slight amount of right rudder. This is put in when the rudder is being cemented to the stabilizer. The entire trailing edge of the rudder is broken loose and re-cemented onto the stabilizer so that it has about 3/16" right offset. The rudder *should not be moved later* under any circumstances.

The ship should be made to climb in the same direction as it glides. To do this, it is necessary to make the one adjustment that will not affect the glide. That is, give the engine side-thrust. Start with the engine pointing straight ahead. As more and more power is added, it will be found that the left turn in the climb will tend to straighten out due to the warp in the left wing panel lifting at higher speeds. As higher speeds are attained in the climb, more and more left-thrust will have to be added. If the ship starts to turn to the right at high speed when adjusted with a warp in the left wing, it will spiral dive, but it will pull out of a left spin even though the circle is extremely tight. So, it is *better* to have slightly too much left-thrust than not enough. Once the ship is adjusted for high speed it should never be flown at reduced throttle.



Report From the West

(Continued from page 8)

tered in the meet. Ed Lansberg and Bob Brown, of Los Angeles, had a couple of original stunt jobs and turned in some very fine flights. The *F.A.S.T. Club* was out en masse with a very sharp looking bunch of team racers. Les McBrayer had his *Highlander* original out for a test flight, and it was clocking in very close to the 107 mph mark while we were watching. Les uses the *McCoy 29* for his power plant. Granger and Lawrence Williams had two of the slickest original all-metal team racers these eyes have ever seen. These two boys belong to the *F.A.S.T. Club* and also to the *Huntington Park Model Engineers.* Their ships carried *K & B Torpedos* for "power duty." One of the nicest team racing flights was made by Keith Storey with his famous *Key*, Jerry Gaston with his original *Rusty*, and Lawrence Williams with his all-metal original. The ships were very evenly matched, and places held very closely throughout the flight. When these lads from the *F.A.S.T. Club* put on a race, it is really something to behold. Team racing should be a definite "must" in any U-control meet. The spectators and contestants were really impressed by the clean-cut semi-scale and scale racers.

The scale event brought out the most beautiful array of ships that we have had the privilege of seeing in many moons. Joe Averitt, of Burbank, checked in with a Boeing *Flying Fortress* that would warm the cockles of any B-17 pilot's heart. Jim Devitt, of Mentone, California, showed his Douglas A-20 attack ship and the finish on this one was like glass. Jim powered his ship with two *Fox 35's* that haul it around the circle at over 65 mph. The ship was built from Cleveland plans and the detail was excellent. Bob Palmer's "Sammy Mason Stearman" was on hand; we saw this ship take first place at the Nationals in 1948. J. C. "Madman" Yates was at the controls on that epic flight and turned in a performance that was second to none. This ship has an *Orwick* for power and weighs in a 3-3/4 lbs. Palmer is a member of the *Burbank Model Club*. The smallest scale job on the field was R. J. Plumley's *Sky Chief* This was Frank Hawk's famous ship, and the model was built from the plans that came out in MECHANICS ILLUSTRATED. This scale job weighed in at 1 lb. 13 oz. and fairly burned up the air. It carried a *Torp 29* for power. Plumley hails from Compton.

It was interesting to note that the stunt fliers are becoming more particular with the finishes that are put on their planes. The *La Mesa Airfoilers* had about the sharpest looking array of stunt jobs on the field. These lads have always taken pains to see that members of their club use "elbow grease" and plenty of sandpaper on their ships to give them a job of which to be proud. Appearance points mean a lot when stunt competition is as tough as it is these days. If you stunt fliers look back on some of the contests that you have flown in, you will undoubtedly remember that appearance had a great deal to do with the final total of points. Bob Palmer is another of the top stunt men who always has endeavored to put on a good finish, and his ships always get a good share of appearance points.

We are sorry to say that the times in speed events were missed by your reporter. It was one of those things that couldn't be helped, but we do know that 137 mph took second place in one class. From the looks of things out here, new records should be set in all classes of speed at the coming Plymouth Eliminations, the Nationals, and the finals at the Plymouth Internationals. Fliers such as Richard Grandel, Dick Rigney, Keith Storey, Lew Mahieu, and many others should do a good job of representing the West in the coming big meets.

Results of the Redondo Beach Meet: *Flying Scale Open*—Joe Averitt; *Jr.*— Barry Robertson; *Stunt Expert*—Bob Palmer; *Open*—Gene Marshall; *Sr.*—Doug Bell; *Jr.*—Harold Selsen; *Stunt Team*—Bob Palmer and company; *Stunt Women's Event*—Anita Bell; *Best Crack-up*—Philip Carpenter;

Speed Class A Open—Jerry Strawn; *Jr.*—Howard Sears; *Class B Open*—Jerry Strawn; *Sr.*—Richard Grandel; *Jr.*—Steve Jentges; *Class C Open*—Jerry Strawn; *Sr.*—Richard Grandel; *Class D Open*—H. C. French; and *Sr.*—Steve Jentges.

* * *

Thought we might tell you of a weird happening about this time. You may be a bit skeptical but there were several eye witnesses. The San Diego Naval Training Center has a large and well equipped hobby shop. They have several very nice fields, on which to fly U-control and small free flight ships, very close to the shop. Charlie Goodale, hobby shop instructor, was out on the field with several of the hobby enthusiasts making ready to test hop a new ship. The stunt job was a *Zilch X* powered with a *Fox 35*. After the ship was airborne, the pilot, one of the sailors at the base, did a few inside loops, and flipped it inverted for a couple of laps. The wind was blowing quite hard and for some reason, our friend disregarded it. A loop directly into the wind caused the ship to bank across the circle and snap the down line at the other side of the circle. With only the up line holding, the ship naturally started making very tight loops. The pilot, fearing that the ship was going to splatter at any moment, turned the control handle loose. The ship made a couple more loops and headed upstairs, trailing the lines and handle behind it. One of the captains on the base got his field glasses on the ship after it had climbed to about 400'. He continued to watch the "free flight U-control" job as it kept a steady, straight, fast climb. The plane went into the overcast which was very close to the 2,000' level. This ceiling was later checked at Lindberg Field, San Diego. When the engine cut, the expected dive didn't happen. For 20 mins. the ship circled around in a very nice glide and seemed to be riding a thermal. It finally landed on the Marine Base in front of the Officers' Club. This was about a mile away from the take-off spot. Some of the personnel on the base saw the ship coming in, and said it made a perfect three-point landing and rolled to a stop—didn't even break the prop! Yep, the lines were still attached. It so happens that one of the spectators was a free flight man; he saw it and still can't believe it. Rather a tough one to swallow, but it happened.

See you here next month.

That's the Spirit

(*Continued from page 23*)

corners are rounded with sandpaper. Bevel the inboard ends of the panels as shown in the sketch and cement them together with 2" of dihedral under each tip.

The completed wing is fitted into the fuselage by cut-and-try. Again, an accurate fit is worth the extra time it requires. The under side of the wing is covered with tissue or light *Silkspan* after the landing gear is mounted.

Prop is carved in the usual manner. Don't leave off the spinner. Size .012 controline wire is okay for the free-wheeler catch.

The best finish we have found for bare balsa is a couple of coats of well-plasticized dope. A final polishing with a mixture of Bon Ami and liquid wax will add luster.

Install a motor of six or eight strands of 1/8" rubber with no slack. Balance the ship at the wingtips and adjust the glide by warping the stabilizer. The original ships would circle either right or left in response to rudder when about 1/16" of right-thrust was used to counteract torque.

When the ship is well adjusted, make up and lubricate an eight- or ten-strand motor about 15" long and pack in at least 600 turns with a winder. And if you are one of those characters who just can't quit when he gets a winder in his hand, here is one fuselage that can stand as many broken motors as your nerves can.

Air Ways

(*Continued from page 27*)

dimensions from a three view drawing which appeared in M. A. N. The ship was built up with the "keel" system and is planked with 1/16" balsa. A *McCoy 49 Red Head* engine is used and mounted in an inverted position. The cockpit is completed with instruments, controls and all other accoutrements. Mr. Cunningham stated that he left off the tail wheel covers and rocket racks because the ship is normally flown from a grassy area and the covers usually got knocked off. He is a member of the *Chico Hornets Model Airplane Club*, and they now have a fine flying site at the Municipal Airport.

Picture No. 4 depicts Gianni Pavesi (Via Ponte Seveso 27, Milano, Italy) with a very attractive free flight model. A *McCoy Sportsman Jr.* engine is employed and the ship, which has a wing area of 954 sq. in., weighs 26 oz. It is equipped with a parachute dethermalizer and consistently turns in flights of 5 to 6 mins. in non-thermal weather on a 22-second motor run.

Our fifth illustration presents a model which Burton Philpot (6037 South Fairfield, Chicago, Illinois) calls *Miss World's Fairfield*. The odd name comes from the fact that the plane is a modified *Miss World's Fair* and Mr. Philpot is a member of the *Fairfield Freedom Fliers Aero Club*. The plane has a span of 34", 132 sq. in. of area, and weighs 2-1/2 oz. It has been found to be a very reliable flier and its best flight was 203 secs. The *Freedom Fliers* is a small group, most of the members being of junior age. They are interested in Classes A and ½A, free flight ships, and endurance gliders.

A modified *Rudder Bug* appears in photo No. 6 and is the work of Raymond Mercier (32 Nye Street, New Bedford, Massachusetts). He built the plane originally with the tricycle landing gear, but bad landings kept tearing out the firewall so he installed the conventional type gear shown herewith. The model is powered with a *Forster 29* engine and is completely nylon covered. Mr. Mercier mentions that he made over 100 test glides before trying any power flights in order to get the airplane adjusted exactly as he wanted it. He feels that the washed-out wingtips are a great help in recovering from banks and turns. The plane is fitted with Good Brothers radio equipment.

In picture No. 7 we see Aldo Berardi (Buenos Aires, Argentina) with his version of the *Gismoe* designed by Jerry Brofman. The model has taken various first and second places in contests in which it has been entered and has turned in a high time of 1 hr. 22 mins. A *Super Cyclone* motor is used and the model is usually flown in contests under the name of *Banana Voladora*.

Our eighth illustration shows a bewildering array of *Tweeks*, an experimental design which Myron Garday (359 Lincoln Avenue, Pasadena 3, California) has been working on for two years. The principle of the design is to get a model to fly with 5 oz., or less, wing loading at zero degree wing incidence. Mr. Garday feels that the neutral incidence gives him the minimum drag effect. He doesn't tell us the sizes of these ships, but it is apparent that they run all the way from ½A on up.

A cooperative job built at Tachikawa A.F.B., Japan, by Cpls. Clifton L. Tinsley and Milo D. Burroughs (Hq. & Hq. Sq., 374th ABG, APO 704, c/o Postmaster, San Francisco, California) is seen in No. 9. This is a scale Cessna 190 built from Earl Stahl's drawings which appeared in MODEL AIRPLANE NEWS, but the ship has been converted to power for a *Baby Spitfire* engine. At the time the picture was made the plane had not been flown because of continuous bad weather. The cowling alone is made up of 51 separate pieces and is easily removable. The model is covered with *Silkspan;* doping started with several coats of clear brushed on, after which the aluminum finish was applied with a spray gun. Trim is maroon, with black decal lettering.

Another ship built from M. A. N. plans appears in picture No. 10. This is the *Wee*

Bipe belonging to Dave Brazelton (1011 Broadway, Normal, Illinois), and the version shown is powered by a *Baby Spitfire* engine. It has been flown many times and is quite successful. A few crack-ups have only served to amaze everyone with the sturdiness of this ship. Dave tells us that the Air Force ROTC at the University of Illinois is sponsoring a model club and the members are allowed to fly in the University's armory. There has been a great deal of interest shown, especially in ½A models, and when flying in the armory, weather is no handicap and the take-offs and landings on the smooth floor are very realistic. Modelers at the University asked us to thank Col. Shedd and Capt. Collie for their efforts on behalf of the club.

The unusual airplane in picture eleven is a radio control job designed by England's famed Henry J. Nichols and built by K. J. Miller (8, Hurst View Road, South Croydon, Surrey, England). He gives no details about the plane aside from the fact that it is powered by an *Anderson Spitfire;* it is apparently fitted with radio control equipment.

The free flight gassie in our last illustration is also unusual because the frame was built entirely of plywood. It is the work of Fred Huber (Breitensteinstr. 57, Zurich 37, Switzerland) and powered with a *Dyno* diesel. Another odd feature is that the wings are swept forward 12°. The model was found to have a very steady 80° angle climb, but originally had a very poor glide. However, flaps were added, which greatly improved the glide. The model was flown for 1-1/2 years without damage, but the wings finally folded in flight and it was learned later that the cemented joints of the main wing spar had come loose.

NEWS OF MODELERS

PEN-PAL SEEKER: Jac Pelle, Boxen Vaartlaan 30, Amsterdam (Z) II, Holland, is 23 years old and a chemical engineer. He would like to correspond with an American model airplane builder who is experimenting with radio control.

EXCHANGE MOTORS: P. Drye, 118 Clarence Avenue, New Malden, Surrey, England, wants to exchange a Mills 1.3 cc. for a *McCoy 9* or *19*. Mr. Drye writes that he will be glad to fit the latest type of carburetor if the person he exchanges with wishes him to do so . . . Kenneth R. Greenhalgh, 74 Clarendon Road, Morecambe, W. E. Lancashire, England, is 16 years of age and is interested in exchanging motors with an American modeler.

CLUB NEWS

California

The *Flightmasters,* writes president Robert E. Moncrieff (1939 Pacific Coast Highway, Lomita), recently tried their "ballot system" of determining winners at a recent meet, whereby spectators voted for the models of their choice. It was unnecessary to set up a point system and use judges; the results were quickly and easily tabulated. Anyone interested in the details of this system may write Bob for them.

Sad story! The *Fresno Hell Divers* have been forced to break up the club since there is a lack of interest. All contest dates have been cancelled.

Connecticut

Members of the *Hartford Model Aero Engineers* have set aside every Monday evening for outdoor flying at the Farmington Valley Polo Association Field. Anyone may come out with his plane but must check it with the caretaker before flying.

Maine

The new *Augusta Flying Maniacs'* headquarters are located at 35 Bangor Street.

Four more members have signed the roster of the *Lewiston Sky Devils* . . . Gordon Sheloske, Arnold Beleckis, Richard Lagasse, and Walter Martin.

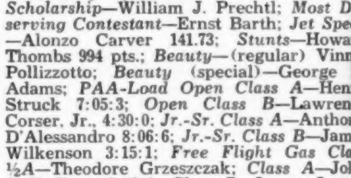
New York

The 5th annual Mirror Air Show and Model Flying Fair took place on June 11, and although the day was beautifully clear, the modelers, in general, were plagued by

Model Airplane News Trophy for 1st place in Radio Control at Mirror Model Meet is presented to James Schenck (right), of Pittsburgh, by Grumman's Al Capra

very high winds. Because of this there was an unusual high percentage of crack-ups and also modelers who failed to fly. However, a good many flights were put in and shipe which went off the edge of the large Grumman Field were retrieved by the delegation of Nassau County police. This year, in addition to the U-control and free flight events which have always been run at the Fair, a PAA-Load event was included and some very good times were made by the heavily laden ships despite the strong wind. There were over 1,000 entrants who started official flying at 6 o'clock in the morning, and an early start was certainly necessary because of the fact that model flying was shut down at 3 p.m. to make way for the spectacular display of big plane events which included flights by many service planes, glider, and lightplane acrobatics, etc. The first-place winners are as follows:

Academy of Aeronautics Casey Jones Scholarship—William J. Prechtl; *Most Deserving Contestant*—Ernst Barth; *Jet Speed*—Alonzo Carver 141.73; *Stunts*—Howard Thombs 994 pts.; *Beauty*—(regular) Vinnie Pollizzotto; *Beauty* (special)—George R. Adams; *PAA-Load Open Class A*—Henry Struck 7:05:3; *Open Class B*—Lawrence Corser, Jr., 4:30:0; *Jr.-Sr. Class A*—Anthony D'Alessandro 8:06:6; *Jr.-Sr. Class B*—James Wilkenson 3:15:1; *Free Flight Gas Class ½A*—Theodore Grzeszczak; *Class A*—John J. Radigan 8:43:0; *Class B*—Jarves Lopez; *Class C*—Edward Ritter; *Radio Control*—James C. Schenck; *U-control Class ½A*—Dave MacRoberts; *Class A*—Donald Morgan 105:43; *Class B*—William Goodhart 119.4; *Class C*—Joseph Mahonchak 122.9; and *Class D*—William K. Underhill.



PAA-Load Even Director Frank Bushey (third from left) looks on as model is processed at Mirror Meet. Left to right, Dave Hunt, Mrs. C. F. Ehman, Bushey, C. F. Ehman, John Termeer, Jr., and owner of the model Wm. Dunker

Ohio

The Junior Aviator Spring Air Carnival, held in Beechwood Village, on Sunday, May 21, was very successful. The contest was limited to boys and girls of 18 years and younger, and its sponsors were the eight *Greater Cleveland Exchange Clubs* and F. Joseph Lorz, chairman. *Champion*—Dennis Dorogi; *Glider Sr.*—John Humphreys 3:28:6; *Jr.*—Dennis Dorogi 2:2:0; *Novice*—Ronald Brich 1:56:7; *Stick Sr.*—Gerald Kedziora 11:34:0; *Jr.*—Dennis Dorogi 2:1:0; *Novice*—Robert Petrushka 2:4:5; *Cabin Sr.*—Ed Petrushka 3:31:6; *Jr.*—John Forbes 2:18:0; *Novice*—Tom Cavannah 2:13:9. The first-place winners were presented with their trophies on the Skyways Radio Program which is heard over WJW, Cleveland, every Saturday morning at 8:45. This program is dedicated to aviation and is spon-

sored by the Cleveland Community Chest and the Cleveland Chamber of Commerce as a public service program. Registrations for the meet were handled by members of the Cleveland Womens Chapter of the NAA. Our thanks to Mrs. John W. Hillegas for sending us this news.

Oregon

We learn through the pages of the West Coast Model News publication that Earl Cayton, of Salem, says the new controline club in his neighborhood is to be known as the *Salem Model Masters*. Meetings will be held every Tuesday evening at the Y.M.C.A. club rooms.

The following are the winners of the free flight contest held on Agate Desert, May 7, by the *Medford Prop Nuts. Towline Glider*—Max Roberson 460.0 secs.; *Rubber*—Robert Lowe 436.9 secs.; *Class ½A*—Ed Gilkey 354.4 secs.; *Class A*—Bob Ottoman 474.6 secs.; *Class B*—Dick Simonson 1,089.0 secs.; and *Class C*—Lloyd Crowell 412.2 secs.

COMING CONTESTS

Aug. 13, IOWA—Clinton, *Illinois-Iowa Aeronautical Association*, U, all classes.

Aug. 13, OREGON—Salem, *Salem Model Airplane Club*, F; info: 2080 Market St., Salem.

Aug. 13, N.Y.—Schenectady, Class A, Harold Bradish R. O. W. Free Flight Gas Contest; restricted to members of *Schenectady Aeroneers;* CD—Dale Springsted, 837 Eastern Ave., Schenectady.

Aug. 13, OHIO—Springfield, Class AA, *Strato-Hawk* Model Meet, all F and R; CD—Aaron Smith, 1813 Woodward Ave.

Aug. 13, MONT.—Great Falls, Class AA, 4th Annual U Flying Circus; CD—Bob Carroll, Box 1000, Anaconda.

Aug. 14 to 21, MICH.—Detroit, Class AAAA, International Ltd. 4th International Model Plane Contest, T, all F, all U Sp, Precision, S, TR; CD—Warren Bartlett, P. O. Box 3118, Detroit.

Aug. 20, N. Y.—Brooklyn, *Sky-Scrapers* 7th Annual Free Flight Contest; CD—Murray Feignebaum, 1709 Benson Ave.

Aug. 20, OREGON—McMinnville, *Sky Wolves'* U Contest; info: *Oregon Aeromodelers Association,* 2080 Market St., Salem.

Aug. 20, OHIO—Shelby, Class A, Shelby *Buzzard's* Invitational Meet, R, ½A F, CO2; contestants only from Northern half of Ohio; CD—Howard Robinson, 16 West Madison Ave., Shelby.

Aug. 20, OHIO—Akron, Class A, *Akron Society of Model Plane Engineers'* Contest for rubber powered models; CD—Lloyd Wellner, 582 Blanche St., Akron

Aug. 27, PA.—Pittsburgh, Class AA, *Pittsburgh Model Airplane Control-Liners'* Contest, Sp, St, S; CD—L. Stoutenburg, Jr., 21 So. Emily St., Pittsburgh.

Aug. 27, OREGON—Portland, *Portland Starduster's* FF Contest; info: same as Aug. 20.

Sept. 3, IOWA—Waterloo, Class AAA, *Waterloo Prop Twisters' Meet;* CD's: Kenneth Satterlee and E. Fletcher, 1146 West 12th St., Waterloo.

Sept. 3 & 4, MICH.—Bangor, Class AAA, *Bangor Flying Carnival*, F, G, R, U; CD—Christy McKee, 126 Monroe St.

Sept. 3 & 4, R.I.—Pawtucket, Class AAA, 4th Annual All New England Model Air Show, F, U Sp, Precision, R; CD—Arthur Bergeron, 55 Richard Street, Seekonk, Mass.

Sept. 4, N.J.—Far Hills, 3rd Annual Lions Club Controline Meet.

Sept. 10, CONN.—New Haven, Class AAA, 1950 Greater New Haven Model Meet, U, Beauty; CD's—William Paulson and Thomas Cimino, 919 N. High St., East Haven.

Sept. 10, N. Y.—Hicksville, Long Island, Class AAA, Invitational Championships for all F, R, G; CD—Alfred Armellini, 212 Raff Avenue, Mineola, Long Island.

Sept. 10, CALIF.—Culver City, Class AAA, *Sky Kings Model Airplane Club's* 2nd Annual Meet, U, St. Sp, S, TR, J; CD—Donald Anderson, 1225 W. 31st St., Los Angeles.

Sept. 10, OHIO—Akron, Class AA, *Akron Society of Model Plane Engineers* Meet, Wakefield type inter-City team competition; CD—Frances Alexander, 25 Mull Ave.

Sept. 17, OHIO—Shelby, Class AAA, Shelby *Balsa Buzzard's* 5th Annual Meet, F, CO2, R; CD—same as Aug. 20.

Sept. 17, PA.—Pittsburgh, Class AA, *Pittsburgh Model Airplane Control-Liners'* U Meet for TR, CD—same as Aug. 27.

U—Controline; F—Free Flight Gas; R—Free Flight Rubber; G—Glider; RC—Radio Control; W—Water Events (ROW); S—Scale; I—Indoor; T—Towline; PAA—PAA-Load; Sp—Speed; St—Stunt; TR—Team Racing; J—Jet Speed; HL—Hand Launched; Class—shows size of meet and signifies AMA sanction; AMA—Academy sanctioned.

Flying Saucer Design

(*Continued from page* 13)

builders would do well to experiment with this type. It is suggested that the motor be affixed near the upper surface of the disc, with the disc revolving opposite to the prop by torque reaction. The prop should be of very high pitch and turn up at a good speed.

A number of interesting angles of experimentation present themselves here: try building non-revolving discs by using coaxial props (blowers) on the motor; short rotor blades could be added around the edge of the revolving disc design as in Fig. 2. In seeking a proto model it goes without saying that some crew provisions must be worked out, for a revolving cabin cannot be used. This would indicate a separate suspension for spinning disc types. However, it is important to keep the C.G. high. If a conventional fuselage is suspended beneath a spinning disc, pendulum action will be set up which is disastrous to flight stability, particularly at low speeds. This is one of the reasons why it is so difficult to fly a free flight helicopter model successfully. Jiggles that develop are translated as deflections to the rotor at 90° from the plane of vibration; each jiggle starts a chain of more jiggles that tend to build up instead of damp out. This is why we articulate autogiro and helicopter blades, or rather, it is one reason for articulation. Spinning discs, however, do not lend themselves easily to articulation which means that the primary layout must be such that jiggles do not develop. If the C.G. is at, or above the C.L. of a disc, there will be no trouble of this nature unless something is badly out of balance.

The true circle wing is shown in Fig. 4. Quite a number of these have been built by the writer, the current one using CO2 jet power. The cross section is nearly symmetrical, with a slight reflex. Two fins are used and there is a slight dihedral developed by means of a deep rib along the center line. The glide is good and stability good for jet power (*Jetex* designs should be very practical). Rubber power has been successful only where torque is corrected for by two props, and the glide with rubber power is terrible, due no doubt to the turbulence induced by the idle props. Jet power seems the ideal solution for this type. The performance is a bit dazzling with CO2 bulbs, because of the tremendous push at the first stage of the flight. This results in a short speed dash followed by a zoom that peters out into a smooth glide. It seems best to locate the jet well forward with the thrust line above the center line and adjustable to iron out stalling tendencies which we found developed on bulb power due to the initial big push of the units. With the more tractible *Jetex* this tendency would disappear.

Fig. 5, the "push-pull" boundary flow propulsion type saucer is well within the possibilities of controline design. This type does not take off vertically, although it might if greatly over-powered. This model was designed by the writer in an attempt to work out, not necessarily a flying saucer type, but a model which could be flown from any surface, snow, ice, deep grass, or water without any particular landing gear requirements and with the elimination of such problems as dirt in the engine and propeller breakage. The main idea here is reaction propulsion with a standard make of model engine (*Drone* diesel), a gain in lift through the boundary flow principle and recovery of velocity by means of a rear located intake scoop. The design shows promise although there are quite a number of angles which remain to be doped out to the best advantage. One is starting the engine in handy fashion. It is decidedly unhandy with the arrangement shown. Further investigation of blower design is indicated, and it is believed that the addition of engine heat to the blower efflux would increase efficiency to a noticeable extent. But this seems difficult to achieve without a radical redesigning job, as the present layout calls for separate engine cooling.

(*Turn to page* 48)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WORLD'S MOST POPULAR HIGH COMPRESSION GLOW FUEL FOR HUMID ATMOSPHERE
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IDEAL SPORT-STUNT FUEL. MORE REVS PER TANKFULL. LONGER OPERATION WITH HIGH PERCENTAGE COMBUSTION
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Possibly a glow plug racing car engine of greater displacement than the present diesel would be a solution to the cooling problem.

There is, currently, a great deal of talk about the sameness of model designs, of the futility of it all in trying to compete with professionals, of the fact that "there is nothing left for the new modeler to do." After all, what is the purpose of model airplaning? Some say it is for sport. Some say, as does the writer, it really is, and should be, an intellectual frontier. This is the real technical "sport," not the competing for cups and trophies, which, aside from offering reassurance that one can build and fly with the best of them, also, to the man who sees it clearly, means "I was lucky, that day," or "If so-and-so hadn't cracked-up his job *he'd* have the cup." The point seems quite clear. Model airplaning is on a plateau. It is in danger of degenerating into the status of "toy airplanes"; indeed, most of the models flying today are "toys." Expensive, tricky, standardized toys. We have two bright spots in the PAA-Load event and in radio control. But both of these fields of endeavor already show signs of safe standardization around previously proven types of airframes. It is very significant that most modelers inquire: "What is the *best plane* for my R.C. unit?" The results might be decidedly more interesting if they asked: "Here I have a method of control, how can I make something basically controllable?"

It might be well to weigh the difference between the improving of *gadgets* and the improving of *concepts*. Currently the trend toward improvement is concentrated on the utilization of improved gadgets. Sight seems to be lost of the fact that it is the concept that produces the gadget, not vice versa.

The flying disc is a concept, a very pure concept for it embraces and expands our previous experience, whittles away most of the extraneous junk that has been glued, riveted, and saddled upon the idea—*effective flight*.

Go ahead and experiment and don't worry too much about being original. Designs 2, 3, and 5, are, to the best of the writer's knowledge and belief, "original." They are mentioned here because they showed experimental promise. But "original" is a very poor word to use to describe the stages of evolutionary concepts. These design layouts would certainly occur to somebody eventually for they are logical embodiments of power and structural possibilities. Any process of mechanical refinement is self-sustaining. The Gro-Magnon who first used a section of tree trunk as a wheel, started the chain of events that produced the automobile. The brothers Montgolfier thought they had invented just the hot-air balloon—but the series of reactions they set off will ultimately produce space ships.

The ideal flying machine hasn't been invented yet. Why not try a flying saucer?

Twin Mustang

(*Continued from page* 15)

Empennage Assembly. Rudders are constructed in the conventional manner by laying down the outside framework and following with the internal members. Medium-hard balsa stock is used throughout. To insure identical rudder surfaces, construct one directly over the other.

Stabilizer-elevator construction is handled in a manner similar to that employed on the rudders; first position the outline pieces and then insert the ribs. Remove the assembly from the drawing after it has thoroughly dried and add the spar.

Wing Unit Construction. The wing of the F-82F *Twin-Mustang* is assembled in three units. Medium-hard grade balsa is used throughout the entire structure, with exception of the leading edge piece which should be of hard stock to preclude buckling in the event of collisions.

Procedure for assembly of the outer panels varies only slightly from that employed for the center section. Commence by first laying out one of the outer panels directly over the plan as previously described. After the unit has dried thoroughly, remove it from the plan and position the dihedral gussets and the tapered spar.

The opposite outer panel may be constructed directly over the underside of the completed panel. This will insure exactness in every detail between the two panels.

Following completion of the above, the tip pieces may be fashioned from soft balsa and cemented in their appropriate positions.

Power Unit Assembly. To enhance fidelity to scale, yet provide more than sufficient thrust for exceptional performance, it was decided to employ four-bladed propellers. Free-wheeling units, developed for installation completely within the spinners, remarkably improve gliding characteristics of the model in flight.

Medium strength, straight-grained balsa is used for the propeller blocks. Dimensions of these blocks are given on the drawings.

Propeller spinners are most easily completed by first fashioning the outside to final shape, splitting through the center lengthwise removing the interior as illustrated and notching to fit snugly over the propeller hub.

Laminated balsa and plywood comprise the nose plug fixtures. Insert a tube bearing through the propeller shaft holes to reduce friction and prevent a wandering thrust line.

Covering. Fuselage assemblies should first be carefully scrutinized to determine their soundness and accuracy of construction. The balsa oil cooler fairing scoops are formed at this time but are not attached. Sandpaper the entire fuselage structures, taking care to remove all roughness which could mar the smoothness of the covering. Formers should be scalloped between stringers with the aid of sandpaper wrapped around a dowel stick or pencil.

Main and tail landing wheel fairing covers, exhaust outlets and tailwheels struts are assembled at this time. They are not fastened into position at this time, however.

Propeller unit assemblies should be carefully checked for balance and given a final sanding.

Color scheme for the prototype varies with the mission of the organization to which the aircraft is assigned. Ordinarily the arcraft will be entirely blue-black or sky blue as viewed from underneath and olive drab as viewed from above.

Rubber model *Silkspan* or "AA" tissue are suitable covering materials. Best results in obtaining a smooth covering of the many compound curves of the fuselage units will be had by limiting the width of covering tissue to several sections between stringers at one time.

Propeller blades and landing gear fairing covers should have tissue applied to their surfaces with a concentrated solution of dope. This not only obviates the necessity of applying wood filler to close pores in the balsa, but multiplies the strength of these parts.

After the covering has been water-shrunk and has thoroughly dried, the doping operation may commence. Clear dope of a fairly thin consistency should be utilized for all paper-covered surfaces, propeller blades and landing gear fairing covers included. The first and third dope applications should be applied lengthwise on all surfaces, with the second coat applied crosswise. A very light sanding of the model, with well-worn sandpaper, should precede the second and third coats of dope.

The propeller units should be color-doped at this time. Blades should be doped black with yellow tips while the hub should be colored to match the balance of the model (either black or olive drab). Four coats of color, lightly sanded between coats, will suffice.

Assembly. The initial phase of this operation cements the rudders to the fuselage units, carefully checking their alignment.

Next join the fuselage units together with the wing center section panel and stabilizer-elevator. This joining will be subject to the greatest stresses imposed upon the entire structure, so apply cement accordingly.

Affix the outer wing panel sections into place, allowing the required amount of dihedral.

Main and tail landing gear fairing covers, tail wheel assemblies, oil cooler fairing scoops and exhaust fairings may now be cemented into their indicated positions.

Following this, the gun port assemblies, insignia and numeral decals may be added. Control panel outline trim may be indicated through use of black tissue strips doped to the covering, or with black dope.

Attachment of the cabin canopy assembly piece is most painlessly completed by first attaching the bond paper fairing as illustrated, and the fastening this to the fuselage. The windshield may then be fitted and installed with little difficulty.

Main landing wheels are mounted between washers soldered to the strut axle. Lengths of black rubber tubing may be split and fastened over the strut assemblies to aid appearance.

Power units are composed of six to eight strands of 1/8" flat T-56 *Brown Contest* rubber, 25" in length. Loop small rubber bands tightly over the ends of the motor units, to prevent knotting of the rubber over the front and rear mountings when fully wound.

Flying the Model. Carefully check the completed model for warps or misalignments in wing and empennage surfaces. Failure to follow this procedure preparatory to test flying may result in serious crack-ups. Balance should be secured at the wing spar position. If the model has been constructed correctly, balance will normally fall on this point.

Next on the agenda is the trial flight phase. Select a calm day and a large, open clearing with a soft cushioning of tall grass. Commence with the gliding of the model, released from a running start to gain flying speed, aimed at a point 20' ahead of the point of release. Notice carefully its behavior. There should be no deviation from a smooth, straight, fluid flight path. If such deviation occurs, immediately check for the presence of warps in the flying surfaces.

Assuming that a satisfactory glide path has been established, the initial powered flights may now be undertaken. Be sure that the motors are wound in opposite directions and to the same degree. If possible, both props should be released instantaneously at the start of a flight.

Initial power flights should be nothing more than mere power glides with only negligible power. There should be no erratic behavior in the flight path of the model. Since torque requires no compensating adjustment, the turn is up to the builder. Increase the power if general performance characteristics warrant.

Launching procedure for R.O.G. flights are the ultimate in simplicity. For hand-launching hold the model with one hand resting on the wing center section panel and the other hand holding the propellers across the center axis. Release the props slightly before the actual launching.

The F-82F *Twin Mustang* will provide one of the most novel and engrossing spectacles obtainable in flight. If given considerate handling, it will provide a source of great interest and enjoyment for a long, long time.

Black Bird

(Continued from page 29)

and wood and allowed to dry; then reglue and join while still wet, using clothes pins to hold the hinges in place. Curl control horn around the end of bicycle spoke forming the rear section of bellcrank, and solder horn. Flipper movement should be 1/4" down and 3/8" up.

Final Assembly. First, glue the stab flat against the upper half; this will insure proper alignment. A notch is then cut into the bottom half to receive the stab. Next, mount the wing in place. Be sure that the wing is set at zero degrees incidence. Remember that the angle of incidence is figured from a line connecting the trailing edge and *the center* of the leading edge. Also, looking at the top of the ship from the rear, skew the wing to the left. The left wingtip should be 3/16" behind perpendicular. This offset holds true if you fly your model to the right—the opposite wing-

tip should trail if you fly to the left. This adjustment will tend to turn the model to the outside of the circle during take-off, which is desired. However, at higher speeds, the line pull turns the model inward a bit, thus helping slightly to counteract centrifugal force. Now wrap and solder both ends of the push rod together after determining the proper length.

Solder up the tank from .005 shim brass stock. The shape and size, of course, will depend on the room left in the fuselage. In the *Black Bird*, it was designed to carry sufficient fuel for 8 laps of clocking—a long grind for an A speed job. However, AMA rules call for only 4 laps, so you can make your tank a bit smaller than that used in the original ship, if you wish. The tank on the original averaged out at 2-3/4" long, 7/8" high, and 3/4" wide. Use 3/32" I.D. brass tubing for the fuel line. Fuel is picked up at the lower rear outside corner. Vents are 1/16" I.D. brass tubing soldered perpendicular to the thrust line. Place the vents slightly below the needle valve level. Be sure and do a good job of soldering the tank—you won't be able to get at it after the fuselage is closed up. Seal the tank in place with plastic wood. Thick walled neoprene tubing is used since this will not bend when connecting the tank and engine; you won't have room to connect it with your fingers. Now, cut away the front of the upper fuselage half forming the base of the cowling and glue the remainder of the fuselage together. The cowl can now be built up. First add cowl formers on the top of the wing and then prop up a roof former. The cowl sides are planked with 1/16" balsa sheet—rock hard—grain running vertically. The top of the cowl is formed by laminating 3/32" hard balsa at right angles; in this manner the cowl top will never crack open during a crack-up. The cowl is held in place with a bicycle spoke. Key the cowl in place with 3/32" hardwood dowls.

A belly skid is made from 1/16" plywood. Metal should be used if you expect to fly over hard top or concrete surface.

Covering and Finish. The stabilizer half containing the flipper and the fuselage portion containing the motor mounts should be covered with silk or gauze and the remainder may be covered with silk or *Silkspan*. Brush on three heavy coats of sanding sealer followed by two thick coats of auto primer. Now, using plenty of elbow grease, sand everything down with No. 280 and finally No. 400 Wet-or-Dry Paper. Repeated dunkings in water will keep dope from clogging the paper. You may now brush or, preferably, spray on thin coats of your favorite colored dope, sanding each coat smooth with No. 400 Wet-or-Dry Paper. After you are satisfied with the finish, spray on a coat of your favorite clear hot fuelproofer. I have found that Testors *Sta* is impervious to *Powermist Nitrol* which we find works well under all atmospheric conditions encountered here in the Northwest.

One last word about color schemes; I notice that many fellows paint their ships bright colors in order to be seen more readily by the timers during clocking runs. I would suggest, instead, that you merely paint on your favorite color and then furnish "Weak-Eyes Willie" a pair of powerful eye glasses to get an accurate clocking!

Completely assembled the *Black Bird* weighed 10 oz., including a one-bladed prop and spinner.

Engine, Prop, and Misc. If you use a *McCoy*, I would suggest that the engine be modified by filing the exhaust stack flush to fit in the cowling. Also, substitute for the stock needle valve, a *Duromatic 90°* needle valve seat and a McCoy *Series 20* racing needle valve. My engine was completely "reworked," but a stock engine will turn in championship performance if kept clean and in top mechanical shape. Many manufacturers state that their engines should never be taken apart. On this point I disagree . . . that is, if real care and common sense are exercised when disassembling. I check the engine interior after every couple of dozen flights, and always after a bad crack-up for worn or damaged parts. Also, taking an engine apart will give a speed merchant an idea of just what makes that speed engine tick. Remember, your engine is the most important factor in hitting high speeds, so take plenty of care keeping it in perfect running order.

The one-bladed prop shown here is actually very simple. Make a collar from .005 shim brass stock and hold in place with small brads or straight pins. Weight is added by melting in bar solder with a good hot soldering iron. File down this counterbalance until correct balance is obtained. Remember, no vibration will be encountered if your prop is a little over-heavy on the counterbalance side, but the engine will vibrate noticeably if the blade side of the prop is over-heavy. Incidentally, if you have never used a one-blader before, keep in mind that the single blade is equivalent to approximately 75% of the total blade area in a two-blader. Therefore, a one-blader must have 25% more area than normal. Using a single-bladed prop, I would suggest starting with a 7-10 1/2 *Power Prop* and thining down the blade area on successive flights until the best speed is obtained. If you prefer a two-blader, start out with a prop like a 7-10 *Tornado* and use the same procedure in determining the proper amount of blade area.

In closing, I stuck to hand-launching on this particular model since most fields in the Northwest are not smooth enough for small Class A dollies. To properly hand-launch: run along, holding the model perfectly level, keeping the lines tight, then open your hands and let the model take out by itself—NEVER THROW. Remember, always check the wind direction and launch down wind. Although smaller than most models in its class, the *Black Bird* launches like a dream using this method.

This is about all fellows, the rest is up to you. Here is wishing you plenty of luck and some mighty fast flying with your *Black Bird*.

Superudevator

(*Continued from page 19*)

outline. As will be seen, *Superudevator* is not mounted at the tail like *Rudevator* was, but up in the cabin. A very good engine is a McCoy 19 or 29 since it is a high performer with a rear intake; the rear intake is not necessary. If your engine has a crankshaft intake, it can be adapted around to the side or rear of the engine with aluminum tube and rubber hose so as to reach the choke disc. However, we have found that an engine like the *McCoy*, which was designed to run at high rpm, is better for two-speed in radio control because it gives a greater rpm difference between low and high rpm. And it is not the low rpm alone but the difference in rpm which says whether you are going to have low enough power to do a power-on touch and go-landing or not.

The final adjustment is in the choice of propeller. Mount the unit on either side of the cabin and block it up in such a position that a direct drive extension shaft can be run to a point near the engine intake. It is best to install the choke disc bearing bracket and shaft, then install the rotary control surface bearing bracket, rear shaft and control surface. Shape and install the choke disc last. This is done so you can coordinate the shape of the choke disc with the actual control positions. The shaft to the choke disc can be 1/16" brass or 1/32" music wire. The shaft to the rotary-control surface can be 1/16" brass (brazing rod), 1/4" rounded balsa, 1/8" aluminum tube or 1/8" hardwood dowel for most of the way and 1/16" brass rod at the rear end. The shafts should be as straight as possible. A universal joint is used at the control unit end of the rear shaft so that accurate alignment of the shaft is not necessary. Two types of universal joints are shown in Fig. 2. Backlash in the rear shaft due to the universal joint, does no harm. But in the choke-disc shaft, backlash might cause trouble so a direct drive is preferred here. Don't mind if the choke disc cannot be located at exact right angles to the engine air intake. Insert a short piece of roughed aluminum tube in the intake, retain it with plastic wood (if a *McCoy*) and file the end so it fits close and snug to the face of the choke disc. The choke disc can be soldered to its shaft, but it is best to mount it as shown for easy removal for shaping by trial and error. Good material for the choke disc is .005 brass or .010 aluminum. It should fit as close as possible to but not drag on the intake. Some flexibility of the disc helps as the engine will then suck it against the intake on the intake stroke. Run the engine and adjust part power by bending the choke disc bearing bracket in or out so that the choke disc covers more or less of the intake as required. Then check the full power and cutoff positions. Either glow plug or spark ignition can be used. We prefer the simplicity of glow plug and get better two-speed results with it. As usual, of course, the stops on the control surface shaft of this unit can be heated with a soldering iron and rearranged to give the desired difference of setting between right and left rudder just as on the old unit. In fact, for those who prefer the simplest rudder control alone, the elevator stops can be placed so that the control gives either two or four positions of rudder, and no elevator.

One interesting point about the choke method of power control on a glow plug engine should be mentioned. We used to think it was sloppy and used excessive fuel, but measurements showed that the engine actually uses less fuel when partly choked than when wide open. The difference is that when choked, it doesn't burn all the fuel and the wet exhaust makes it appear as though it was drawing fuel from the tank at a greater rate.

Before closing, a few comments on why we place elevator at the bottom of the list of the three most important radio controls. First, comes rudder which we all agree is by far the most important. Besides doing all the simple maneuvers in a horizontal plane, you can also spiral and loop with rudder alone. Two-speed engine control is important because it is the most simple and effective altitude control. You don't have to use such a low-power engine or such a short fuel supply for fear your ship will climb away and get lost. You can have a nice healthy amount of power for climbing quickly when necessary and you can cut off your engine when you want without having to wait for the fuel to run out. Still more important is the fact that engine control makes it possible to go after that exciting maneuver of power on touch-and-go landings.

But look at elevator. If it were a proportional or trimmable elevator, it might be useful for screaming dives and consecutive loops, but the weight and complexity it takes to get such an intelligent elevator is entirely too high. If the elevator is the step function type that gives only full up or down, it is only good for violent and uncontrollable maneuvers in a vertical plane. A step function rudder is different. You can turn it On and Off for different lengths of time and get different results although a step function elevator that is strong enough to hold a ship in a considerable dive against the pull-up force of the horizontal stabilizer cannot possibly produce smooth flight. Worse yet, assume that this step function elevator is of the cyclic type wherein you must go through up and down elevator to get other controls. Then, if the elevator is strong enough to produce a screaming dive, what do you have when you go through it? A violent nose-up or nose-down pitching moment that would be very annoying. The elevator on *Superudevator* is just such a step function, cyclic control, but it is not strong enough to cause trouble when passing through it. It is only worth its weight because it weighs so little and because it is very handy for doing whip stalls, flaring-out on landing, taking the zoom out of a recovery from a sharp turn, mushing-in for a short landing and such maneuvers. It can also be used for increasing speed while flying up wind now that the economy switch has been added. In short, we like it because it gives you something extra for almost nothing in added weight or current drain.

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Design Forum

(*Continued from page 18*)

you must also double the propeller blade area, *for the same angle-of-climb*. If this is not done, the climbing angle will suffer.

Mr. Dexter Jensen, of 520 Tenth Avenue, South, Clinton, Iowa, has a similar stalling problem. Although his plane is a monoplane, in his particular case he gives a wing incidence angle of 1-1/2° and a cambered stabilizer incidence of minus 2°. The wing is a parasol, therefore, less difference in angle between wing and stabilizer is required. We suggest that he reduce the wing and increase the stabilizer angles-of-incidence.

Mr. Swaney's trouble may be similar. He may have too much *negative* stabilizer angle. He says, however, that he has increased it on occasions without results. He also says that he has a 5° angle-of-incidence in the top wing and zero incidence in the lower, as in Fig. 2. Now compare this combination with Fig. 1. If the stabilizer area is at least 25% of the wing area, longitudinal stability should be sufficient, *provided the tail moment arm is at least 3 times the wing chord*. However, in the SE 5, the tail moment arm is short, at the most 2-1/2 times the chord, so here is one possible source of trouble. In such a case the stabilizer effect is equivalent to the area times the moment arm. The value of 25% therefore is approximately 20% too small. Thus the minimum stabilizer area should be 30% of the total wing area. This means 30% of the area of both wings, not just one; 33% would give even better results.

The second possible cause lies in the angle-of-incidence of both wings. You will note in Fig. 1 that the top wing has 2-1/2° and the lower about 1-1/2° angle-of-incidence. The top wing might have 3° but this is maximum. When 3° is used, the lower wing should have 2°. This leaves a *difference* in angle of *one degree* between top and lower wing, which difference is called "decalage." If the wings are staggered, with the lower wing rearward of the upper, and "decalage" also is used, a decided longitudinal righting moment is created when the plane is disturbed longitudinally. In effect, the lower wing being of lesser angle than the upper and rearward of the upper, serves as a negative stabilizer. Under these conditions we believe that Mr. Swaney's 5° and 0° combination for the wings is completely out of line. This may well be the cause of his trouble, because at certain steep angles-of-attack, the drag of the upper wing increases tremendously compared to the drag of the lower. This could produce a decided stalling moment. We suggest that he place his wings at 2-1/2° and 1-1/2° relative to the thrust line. Do not use down-thrust or side-thrust of any kind; these are *merely palliatives* to cure or balance a fundamental defect of stability-design, that should not be in the airplane in the first place.

There is one other word of caution for biplane builders in respect to stability. Place the wings so that the thrust line passes approximately through a point equidistant from the center chords of both wings. The distance of the thrust line from the lower wing should never be less than 50% of the gap between the wings. (See Fig. 1.) In a setup where the thrust line is very close to the lower wing the plane is apt to have a tendency to roll and swing the tail from side to side violently, especially if the fin area is not unusually large.

You will note in Fig. 1 that the fin area of a biplane is less than in a monoplane of the same area. Less fin area is required because for a given area the span is less. Usually the minimum fin area is 8% of the wing area when the moment arm is four times the wing chord. In such a case a monoplane would usually have 10% minimum fin area. Dihedral should be the same as in a monoplane; not less than 3/4" on each wingtip *for every foot* of wing span; 1" per foot of span is safer. This means, each tip should be raised 3" for a 3' span.

Now we come to the critical factor in respect to *flight efficiency*, the propeller. In about nine cases out of ten, modelers who build biplanes, equip them with propellers that are considerably too small. The author has found through a series of experiments covering many years that to maintain a model airplane in level flight *without any climbing angle* the propeller blade area should be approximately 4% of the wing area. This amount of area allows no climbing angle. As more power is added to such a propeller in order to induce climbing, propeller efficiency loss becomes excessive because climb will be purchased at the expense of blade angle-of-attack as shown in Fig. 3. In such a case, in order to absorb more power and deliver more thrust the blade angle-of-attack must increase so that the drag increases to balance the doubled torque. The normal blade angle-of-attack should be 3°, so it is doubled to 6°, to absorb the doubled power. More drag is generated in proportion to thrust. Actually the drag will double, but the thrust being of lesser proportion at this higher angle-of-attack, (6°) will not be double the original amount. So you have doubled the power, but will get only about 20% more thrust. On the other hand, if the propeller *blade area* is doubled when the wing area and power is doubled, then there will be *twice* the thrust at 3° angle-of-attack, because the extra power is absorbed by *the extra blade area and not by an increase in the blade angle-of-attack*.

So the question is, what blade area is sufficient for various degrees of climbing? A blade area of 10% of the wing area usually will provide a medium-low angle of climb. With an area of 15%, climb angle would be medium-high. For a very steep climbing angle, such as in high-powered contest models, the blade should be at least 20% of the wing area.

Now, Mr. Wood may possibly understand why his biplane is an excellent sport model but does not give contest performance. We cannot definitely say that this is the trouble but we have strong suspicions that larger blade area will increase his performance. Mr. Wood does not give the area of his

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MODEL AIRPLANE NEWS

propeller blades, but 16" propellers built to contest lines usually do not have more than 24 sq. in. of blade area and usually only about 20. To give a medium-low angle of climb his blade area should be at least 32 sq. in. because his wing area is 320 sq. in. To give contest climb the blade area should be at least 40 sq. in.

All of this is predicated on the assumption that the pitch is 1-1/2 times the diameter; in this case it should be a 24" pitch. The area of any propeller is proportional to the square of the pitch, approximately. If the pitch is reduced to 20" from 24", the area of the blades may be reduced approximately 35%. With a 24" pitch the blade area should be at least 40 sq. in. when the diameter is 16". The blade area need be only 26 sq. in. if the pitch is 20" and the diameter 16". Mr. Wood's propeller probably is not more than 22 sq. in. in area. He can correct this trouble in two ways: use a four-bladed propeller with each blade having from 8" to 10" of area, or increase the diameter of his two-blade prop to about 20" and use an average blade width of 2".

Another feature which effects efficiency, though to a lesser degree, is the gap between the wings. The smaller the gap, the greater will be the interference between the wings, that is, the airflow from the top wing will reduce the lift of the lower wing. Usually the top wing gives 60% of the total lift and the lower wing gives 40% when the gap is equal to the wing chord. On the average biplane, however, the lower wing efficiency increases rapidly with an increase in the gap. So in models where there are *not* many struts and wires to give greatly added drag when the gap is increased, a gap of 1-1/2 times the wing chord is commonly used. This allows the lower wing to operate with nearly full efficiency, so where wings have a chord of 4", the gap should be 6". More is even better, provided *only a few* inter-wing struts are used.

One of the reasons for possible trouble with Mr. Swaney's *SE 5* model is the excessive wing chord compared to the tail moment arm. When this setup occurs, *stabilizer area* must be increased proportionally. On one biplane model built by the author, a stabilizer area of approximately 42% of the wing area was used. This looked very large compared to the wings. However, it provided immediate correction when only a slight longitudinal deviation took place. This made it possible to move the wings backward and forward one full inch in relation to the center of gravity, without creating stalling or diving conditions. In other words, the wing position relative to the C.G. was not critical, due to the excessive corrective effects of the stabilizer. Try this sometime when you really wish a model that will fly under all conditions without critical adjustments.

We have had a number of letters from Dino Sayers, who wishes to know how to find the center of gravity and the C.L.A.

Mr. Sayers sends us a sketch of a Wakefield design with a wing section of irregular contour, Fig. 4. He says the airfoil shown is his "pet," which he has designed to incorporate high lift with low drag. "Flights were straight and level with no lift and then suddenly it would climb like a rocket, but when it reached the end of its power, it would slide back on its tail." The answer is simple: the cause is his "pet" wing section. This section will create sudden changes in lift, at particular angles-of-attack, and, contrary to his belief, the drag is excessive due to the sudden break in the under surface contour. At a low angle-of-attack, the center of pressure on the wing will be near the rear or trailing edge, with the airflow "jumping the gap" in the lower surface and creating drag behind this gap. At high angles-of-attack, the air will cease to jump, or will jump this gap only slightly, thereby creating sudden and excessive lift *nearer* the leading edge. With these conditions a slight increase in the angle-of-attack will create stalling. In plain words, the center of pressure jumps backward and forward when there is only a few degrees of change in the angle-of-attack. Erratic wings similar to this and various other types have been tried and found wanting. There is no advantage in such a wing section.

Flash

(Continued from page 7)

by the Civil Aeronautics Administration. The CAA has certificated the Allison J-33, the Pratt & Whitney J-42, the big General Electric J-47, and now the little Westinghouse J-30 turbo-jet engine. This gives a potential commercial jet transport designer a range of jet power from 3,000 to 5,200 lbs. of thrust. Boeing has completed studies for the use of two J-30's mounted in pods under the wing of the *Stratocruiser* in mounts similar to those used on the B-47 and the B-36D.

THOSE THIN WINGS on super-speed jet fighters and bombers have proved a source of real design headaches since they leave no room for anything inside but the structure to support them. As a result, Boeing had to put the engines of the XB-47 outside in suspended pods, the landing gear and fuel supply in the fuselage. Now comes the problem of additional fuel for greater range and the perennial question arises: where will it go. On jet fighters the extra 10-20% fuel capacity is conveniently hung in drop tanks at the tips but that percentage adds up to quite a hunk of tank in a plane the size of the B-47. But having no other choice, Boeing is using two huge 1,500-gallon external fuel tanks on the B-47A production model of the *Stratojet* bomber. The tanks will be mounted under the wing close inboard and give the already-bedecked swept wing bomber a real Christmas-tree look. The tanks are being built by Ryan Aeronautical Corporation in San Diego, Calif., of stainless steel.

THE FAMED USAF "Thunderstorm Project," participated in jointly by the U.S. Weather Bureau and the National Advisory Committee for Aeronautics, determined that the best thing to do about the problem of flying in thunderstorms was to avoid them! The Royal Air Force, however, has decided to train all its pilots in thunderstorm flying on the theory that it is not dangerous provided you do it right. Taking a leaf from the data of the U.S. tests, the R.A.F. is teaching its pilots the classic rule that in flying through a thunderstorm the pilot should ignore his altimeter and simply concentrate on keeping his airplane on a level keel. "Thunderstorm Project" tests disclosed that most of the difficulties were caused by pilots trying to keep up with their wildly-fluctuating altimeters in an attempt to maintain altitude. The tremendous up- and down-drafts in a thunderstorm make this dangerous (if not impossible) so the new rule is to simply "ride the drafts" and keep the airplane level. But the Civil Aeronautics Administration warns that such flying is not for civil pilots and reveals that more than 70% of civil fatalities last year were caused by pilots continuing into bad weather in the mistaken belief that they "could make it" instead of turning back.

AT THIS WRITING it looks like the National Air Races as we have known them are finished! Secretary of Defense Louis Johnson has informed the NAR that no military aircraft will be allowed to participate this year, which just about robs the Races of all the glamour and thrill that it had. Fred C. Crawford, Race president, is giving serious thought to cancelling the whole show but is undecided as this is being written. The Air Forces had earlier forbidden closed course racing for jets but had agreed to straight-a-way dashes over 10 and 100 km., the official F.A.I. speed distances. That meant new world's speed records for sure this year. Without the military, all that is left is the lightplane races (surplus military events were earlier abandoned, such as the historic Thompson Trophy Race) and the usual stunting exhibitions. Personally, we think the august Air Force belongs to the American people—to see and hear and touch at frequent intervals—and is not the personal property of Mr. Johnson! Meanwhile, the British are lining up the Gloster *Meteor*, Vickers-Supermarine *Attacker*, DeHavilland *Venom* and Hawker P.1052 for the S.B.A.C. Challenge Cup Race, which we require two circuits over a six-sided 100-km. course!

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